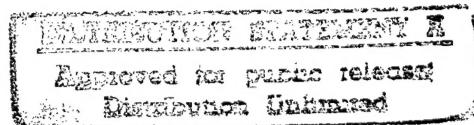




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UDC 577.1

Gamma-Irradiation-Induced Mutational Variability in Quantitative Traits of Oats

18400302b Moscow ZHURNAL OБSHCHEY BIOLOGII in Russian Vol 49 No 6, Nov-Dec 88 (manuscript received 24 Oct 85) pp 786-791

[Article by V. G. Volodin and M. P. Shishlov, Institute of Genetics and Cytology, Belorussian SSR Academy of Sciences, Minsk; Belorussian Scientific Research Institute of Agriculture, Zhodino]

[Abstract] It is generally recognized that mutation breeding with oats has been far less successful than with other crops. In an attempt to improve this situation, trials were conducted in which gamma-irradiation of seeds obtained from the hybrid variant Condor, the Nadezhnyy variety, and the mutant Belozernyy was combined with high concentrations of nitrogen fertilizer. The results demonstrated that, in combination with high nitrogen doses (180 kg/ha), the approach was useful in increasing the frequencies of micromutations affecting valuable traits to a range of 0.2 to 4.7% in the M1 and M2 generations. Radiosensitivity was demonstrated by the fact that the optimum irradiation dosage for the Condor hybrid was represented by 10 kR, and for the Belozernyy mutant strain 15 kR. The data were consonant with the view that M1 plants that exceed a mutation frequency of X plus or minus 3 represent valuable

starting material for further selection, as they may favor an increase in the frequency of mutations in the M2 generation plants. References 12: 7 Russian, 5 Western.

UDC 631.523

Problems in Long-Term Plant Hybridization

18400302c Moscow ZHURNAL OБSHCHEY BIOLOGII in Russian Vol 49 No 6, Nov-Dec 88 (manuscript received 10 Oct 86) pp 792-800

[Article by V. F. Lyubimova, Main Botanical Garden, USSR Academy of Sciences, Moscow]

[Abstract] A literature survey is presented of problems and prospects of long-term hybridization techniques as a means of enriching the crop genome. Based largely on Soviet publications, the consensus appears to have been reached that any dramatic advances in the future will have to rely on the rapid implementation of new technologies in crop hybridization. Accordingly, there will be greater emphasis on in vitro cultivation of underdeveloped plant embryonic tissues on synthetic nutrient media, somatic and parasexual hybridization, and the use of androgenetic and other haploids and homozygotic dihaploid forms. Additional techniques shall utilize somatoclonal preparations and plants regenerated from callus tissues and the use of variants with foreign chromosomes. References 32: 26 Russian, 6 Western.

UDC 577.153.4.047

Mechanism of Reversible Inhibition of Cholinesterases by Thiophosphonates

18400291c Moscow IZVESTIYA AKADEMII NAUK
 SSSR: SERIYA BIOLOGIYA in Russian
 No 6, Nov-Dec 88 (manuscript received
 16 Jul 86) pp 926-929

[Article by N. N. Kovalev, Ye. V. Rozengart, M. B. Gafurov, D. N. Dalimov, and A. A. Abduvakhabov, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; Institute of Bioorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] Comparative kinetic studies were conducted on the inhibition of acetylcholinesterase (AChE; human erythrocytes), butyrylcholinesterase (BChE; equine serum), and cholinesterase (ChE; squid visual ganglion) by O-ethyl- (I) and O-butyl- (II) O-/N-(β -hydroxyethyl)piperidyl/methylthiophosphonate and by N-methylpiperidine (III). The inhibition constants demonstrated that the agents in question behaved as reversible inhibitors, with I and II inhibiting AChE and ChE to a greater extent than they did BChE. In the case of AChE, II was a more potent inhibitor than I; however, both compounds were equally effective as inhibitors of ChE of squids from different geographic regions. Compound III was a much weaker inhibitor of AChE and of BChE than either I or II. Compound III showed variable degrees of inhibition of ChE, depending on the geographic origins of the squid; in addition, both uncompetitive and noncompetitive forms of inhibition were seen. These findings suggest that I and II bind at the active site via the phosphoryl moiety, as do irreversible organophosphorus inhibitors. References 6 (Russian).

UDC 577.15.048

Anticholinesterase Activities of Alkyl Esters of Perfluoroalkyl Phosphonic and Phosphinic Acids

18400293a Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 60 No 6, Nov-Dec 88 (manuscript received 30 Mar 88) pp 38-42

[Article by A. P. Brestkin, A. V. Golovanov, A. I. Lavrentyev, I. G. Maslennikov, and N. A. Yanson, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] As part of the screening trials for efficient and selective insectoacaricides, studies were conducted involving the cholinesterase inhibitory activities of alkyl esters of perfluoroalkyl phosphinic and phosphonic acids on equine serum butyrylcholinesterase and human erythrocyte acetylcholinesterase. The studies demonstrated that esters with the formulas $(RO)_2P(O)X$ and $RO(R_1)P(O)X$, where R and R_1 = alkyl groups and X =

CF_3 or C_2F_5 , are irreversible inhibitors of cholinesterases. The inhibitory activity increased with elongation of the alkyl group from CH_3 to C_4H_9 and was more pronounced in the case of butyrylcholinesterase than against acetylcholinesterase. In addition, it was shown that the view that the thiophosphoric acid esters fail to inhibit cholinesterases because the thionic sulfur group (P-S) cannot form strong hydrogen bonds is inapplicable to the perfluorothiophosphonic acid esters. The compound $(C_2H_5O)_2P(S)CF_3$, in fact, was shown to be a stronger inhibitor than $(C_2H_5O)_2P(O)CF_3$. This was attributed to the fact that one of the F atoms is capable of forming a hydrogen bond with an appropriate atom at the active site of the enzyme, in analogy to hydrogen bond formation by the phosphoryl oxygen (P=O) in cholinesterase inhibition by phosphoric acid esters. References 11: 8 Russian, 3 Western.

UDC 577.352(26+465)

Effects of pH on Voltage-Dependent Ionic Channels Formed by Staphylococcal Toxin in Phosphatidylcholine Bilayers

18400293b Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 60 No 6, Nov-Dec 88 (manuscript received 5 Feb 88) pp 60-66

[Article by O. V. Krasilnikov, P. G. Merzlyak, R. Z. Sabirov, V. I. Ternovskiy, and R. K. Zaripova, Institute of Physiology, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] An analysis was conducted on pH effects in voltage-dependent Ca channels formed in phosphatidylcholine bilayers by the α -toxin of *Staphylococcus aureus*. Determination of the volt-ampere characteristics over a pH range of 3.5 to 7.0 demonstrated that the relatively weak voltage-dependence at neutral pH became much more pronounced as the pH was lowered. Despite this observation, effective charge transfer was not affected, i.e., it was unrelated to transmembrane translocation of ionizable groups within the channel. The effective charge transfer appears to reflect changes in the dipole moment of α -helical regions of the hexameric toxin channel. Concomitantly, the energy parameters and relaxation kinetics of the charge transfer process showed significant changes. The fact that the values for ΔG_0 were not dependent on the sign of the potential, but on its magnitude, indicates that the closed states at "+" and "-" potentials differ in terms of energy and, conceivably, in structure. These observations point to asymmetric disposition of ionogenic groups on amino acids in the toxin channels, which, in turn, determines functional dependence of the channels on pH. Figures 6; references 11: 6 Russian, 5 Western.

UDC 577.352(26+465)

Conductivity and Diameter of Latrotoxin-Induced Channels in Lipid Bilayer

18400293c Kiev UKRAINSKIY BIOKHIMICHESKIY ZHURNAL in Russian Vol 60 No 6, Nov-Dec 88
(manuscript received 25 Nov 87) pp 67-71

[Article by O. V. Krasilnikov, R. Z. Sabirov, A. N. Chanturiya, and A. V. Parshikov, Institute of Physiology, Uzbek SSR Academy of Sciences, Tashkent; Institute of Biochemistry imeni A. V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Channel-forming capabilities of unpurified spider *Latrodectus tredecimguttatus* venom and its purified component, α -latrotoxin, were investigated to determine the factors in the venom responsible for ionic channel formation. The resultant data showed that with both preparations, pores of about 9 Angstroms in diameter were formed in phosphatidylserine bilayer membranes, albeit with an almost two-fold difference in conductivity. The manner of preparation and storage of latrotoxin was found to affect conductivity, which indicates that clusters of the toxin were the components responsible for the formation of Ca channels, which shared essentially identical charged groups. These observations also showed that latrotoxin is a highly labile entity, since such procedures as lyophilization and freezing-thawing cycles alter its charge composition and, hence, the conductivity of the resultant ionic channels. Figures 3; references 15: 11 Russian, 4 Western.

UDC 577.175.852

Study of the Interaction of Angiotensin Fragments and Analog With Rat Adrenal Cell Receptor

18400305 Moscow BIOKHIKIYA in Russian Vol 53 No 11, Nov 88 (manuscript received 28 Sep 87) pp 1883-1887

[Article by G. G. Kublis, Ye. A. Porunkevich, and G. I. Chipens, Institute of Organic Synthesis, LatSSR Academy of Sciences, Riga]

[Abstract] Angiotensin (AT) Asp-Arg-Val-Tyr-Ile-His-Pro-Phe, a low-molecular-weight hormone, is one of the most important regulators of blood pressure. In an investigation of the role of C- and N-terminal amino acids of AT in the accomplishment of the first phase of the hormone-receptor interaction—the binding of the hormone to receptors on the surface of cell membrane—the authors performed a radioreceptor assay of the interaction of modified AT analogs and fragments with isolated rat adrenal glomerula cells. It was shown that Arg² and Val³ residues played an important role in an effective binding of AT to cell receptors. The presence of C-terminal carboxylic acid group in position 8, in the vicinity of the bulky lipophilic residue was required for this to occur. The Asp and Asn residues in position 1 of the AT were not essential for the binding of hormone to adrenal cell receptors.

Comparison of the results of the study of the binding with cell receptors of the short AT molecule suggests that the information needed for binding the AT molecule with the receptors is located along the entire length of the molecule. Figures 4; references 6: 3 Russian, 3 Western.

UDC 577.323

General Characteristics of DNA Sequences at Protein-Binding Sites

18400328b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 304 No 3, Jan 89 (manuscript received 19 May 88) pp 741-745

[Article by R. A. Abagyan and A. V. Ulyanov, Institute of Molecular Biology imeni V. A. Engelhardt, USSR Academy of Sciences, Moscow]

[Abstract] It has come to be accepted that protein binding to selected sites on DNA nucleotide sequences depends on two factors: recognition of specific nucleotides and conformational features of the helix or flanking moieties. The designations 'digital' and 'analog,' respectively, have been used to describe these two forms of interdependent molecular recognition. Digital recognition has been well defined and relies on the interaction of selected chemical groupings on the protein, with appropriate grouping presented by the A-T, T-A, C-G, and G-C nucleotide pairs. In order to define factors responsible for analog recognition, a study was conducted on the DNA sequences of SV40 virus reacting with topoisomerase I. The DNA sites were identified as strong, average, or weak in binding topoisomerases isolated from rat liver and wheat, and the sequences were compared with those of nucleosomal DNA. It became apparent that in cases of weak binding, even when the appropriate nucleotide quartet was maintained, flanking nucleotides altered the rotational configuration of DNA in such a manner that efficient binding was impossible. In some cases, the rotational position was shifted some 180°, accounting for the fact that topoisomerases may fail to act on DNA sequences that otherwise constitute ideal target sites. On the basis of the correlation coefficients for dinucleotide frequency matrices and rotational orientations, predictions may be made as to the likelihood of firm protein-DNA binding. Figures 1; references 14 (Russian).

UDC 577.112.5

Synthesis of Visual Rhodopsin in Cell-Free Translation System. 1. Influence of Synthetic mRNA Structure in Visual Bovine Opsin on Translational Effectiveness

18400370 Moscow BIOORGANICHESKAYA KHIMIYA in Russian Vol 14 No 12 Dec 88 (Manuscript received 20 Apr 88), pp 663-1670

[Article by S. A. Zozulya, V. V. Gurevich, B. Ye. Shmukler, M. Yu. Natochin, T. A. Zvyaga, S. M. Gryazinov, and Ye. P. Shirokova, Institute of Bioorganic Chemistry imeni M. M. Shemyakin, USSR Academy of Sciences, Pushchino]

[Abstract] One promising approach to structural-functional studies of visual rhodopsin is the use of genetic engineering. A necessary condition for this approach is expression of the cloned apoprotein-opsin gene in some system and production of functionally active recombinant rhodopsin. Eukaryotic cell-free translation systems are most promising due to their experimental simplicity and the speed of the cycle of the mutant gene—a mutant protein that is important for a detailed investigation of the mechanisms of operation of rhodopsin by protein engineering methods. However, the use of such systems for the biosynthesis of protein

has been analytic in the past due to the comparatively low levels of expression. The main goal of this work was to study the possibility of preparative synthesis of bovine visual opsin in a cell-free translation system from wheat seeds in quantities sufficient for structural-functional studies. Optimization of the 5'-nontranslated area of mRNA of the visual opsin was used to achieve levels of expression of opsin up to 30 µg of protein per ml of translation mixture *in vitro*. This level is sufficient for structural-functional investigation of the rhodopsin by protein engineering methods. Figures 4; References 32: 2 Russian, 30 Western.

UDC 581.19

Callus Formation and Regeneration of Solanum Laciniatum

18400324a Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA BIOLOGICHESKAYA
in Russian No 5, Sep-Oct 88 pp 34-37

[Article by A. U. Akhanov, G. D. Sadykova, and A. D. Dosymbayeva, Institute of Molecular Biology and Biochemistry, KaSSR Academy of Sciences]

[Abstract] Callus formation, suspension cultures, and plant regeneration from *Solanum laciniatum* were investigated in relation to the synthesis of steroid alkaloids. Callus formation was optimum on Murashige-Skoog medium when supplemented with vitamins; however, the levels of steroid alkaloids were 1- to 2-fold lower than those produced by the plants. Suspension cultures of *S. laciniatum* were similarly inefficient in the biosynthesis of steroid alkaloids. However, plants regenerated from callus tissues produced steroid alkaloids on levels seen with control plants, indicating that complete cellular differentiation constitutes a prerequisite for the expression of the full metabolic potential of *S. laciniatum*. Figures 2; references 6: 3 Russian, 3 Western.

UDC 614.7+614.3/.4/:008(4+57)

Ecological Thinking and Tasks of Sanitary-Epidemiological Service

18402015a Moscow SOVETSKOYE ZDRAVOKHRANENIYE in Russian No 1, 1989 pp 14-17

[Article by A. I. Kondrusev, USSR Ministry of Health, Moscow]

[Text] The great political and social changes occurring in our society have radically changed people's attitudes toward the urgent problems of Soviet health care. Today, as never before, shortcomings have been detected in environmental protection and improvement.

Analysis of the environmental protection work in the country shows that there has been no appreciable improvement in the ecological or public health situation in the past few years.

A number of regions located in the Aral Sea Basin continue to remain a zone of ecological disaster. The continuing pollution of the Black, Caspian, and Baltic seas has resulted in a situation where the sanitary-epidemiological service has been forced to ban the use of individual beaches during the summer health improvement season in Georgia, Latvia, Lithuania, Estonia, and the Ukraine. To our great chagrin, the quality of marine waters continues to deteriorate.

The situation that has evolved regarding the pollution of reservoirs and water tables with industrial, farm, and municipal wastewaters—plus the inadequacy of industrial equipment in preparing drinking water—has resulted in a worsening of water quality in a whole array of administrative territories. Poor-quality drinking water is one of the main reasons that each year in our country more than 2.5 million persons contract acute intestinal illnesses and more than 9,000 contract typhoid fever. Because of a lack of centralized water supplies, one in three inhabitants of Central Asia is forced to use water from irrigation systems that contains toxic chemicals, nitrous compounds, and agents of infectious diseases.

Protection of atmospheric air is also proceeding in an unsatisfactory manner. Improvement of motor vehicle designs is proceeding unacceptably slowly, as are the improvement of systems to service and inspect them and the transition to ecologically clean types of fuel. Motor vehicle emissions already account for about half the total volume of atmospheric pollution. Continuing construction of industrial facilities like the Astrakhan Gas Complex, with flagrant violations of the requirements of environmental protection legislation, is creating a constant threat for everything living in these regions.

The ever-increasing use of pesticides and plant growth regulators in agricultural production represents a serious hazard. Health requirements related to neutralizing or burying toxic chemicals that have become unsuitable for

use and the rules of using, storing, and transporting pesticides are not being adhered to. Intensive pollution of the environment with toxic industrial wastes is continuing. A large portion of these wastes is being transported to tailings dumps and sludge dump sites whose technical level does not guarantee the prevention of environmental pollution. Such wastes are being transported to city dumps and to sites with unorganized stockpiling.

Pollution of the natural and production environment continues to have an ever-increasing negative effect on the state of the public's health. This is especially clear when the morbidity indicators in cities with the highest environmental pollution levels are analyzed. A significant increase in specific allergic illnesses related to chemical and biological pollution of the air has been established.

The worsening ecological situation and the massive multiyear effect on the public of an entire set of unfavorable environmental factors has resulted in a situation wherein the adaptation capabilities of the human body have practically been exhausted. The most unfavorable prognoses of the status of public health are therefore arising. The health of children is causing special alarm. It cannot be considered satisfactory today.

In the situation that has come about, protecting man from the effects of harmful environmental factors is one of the high-priority tasks of health care workers and above all of the sanitary-epidemiological service.

The country's sanitary service must make an in-depth analysis of the status of the public's health and determine the consequences and forecast the effect of environmental factors. This analysis must be made the basis for the in-depth development of priority hygiene-prophylactic and antiepidemic measures along with an assessment of the measures' completeness, adequacy, and effectiveness.

All of the sanitary-epidemiological service's activities are directed toward this. Preliminary estimates show that full-fledged monitoring of the country's ecological situation and observation of public health standards and rules will make it possible to reduce environmental pollution by 25 to 30 percent, improve living and leisure conditions for 40 million persons, improve working conditions for 25 million workers, and reduce work-related injury and occupational morbidity by 10-20 percent in a short amount of time.

Clear, specific recommendations related to making more effective use of legislation on the sanitary protection of soil, water reservoirs, and the air basin have been developed for the organs of the state sanitary inspection. Stricter economic sanctions for enterprises inflicting harm on human health and causing irreplaceable losses to the environment have been prepared and are being introduced. The introduction and operation of industrial and agricultural facilities without purification equipment and with no sanitary-protection zones set up is

forbidden. Strict implementation of measures to preserve the environmental balance and prevent environmental pollution will make it possible to reduce morbidity and worker and employee sick time by 15 to 20 percent.

The development of democracy and glasnost in the Soviet people's society and the new political thinking are creating the prerequisites for the more active participation of the public in the solution of ecological problems. Open discussion of various environmental protection problems must be organized, as must the regular public examination of construction projects and the redesign of large and ecologically significant national economic facilities.

A number of positive examples of the effect of public opinion on processes of ecological development already exist today. With public opinion taken into account, further measures to improve the ecological situation in the Lake Baykal region are being developed to solve the region's problems associated with preserving the environment. Public examination of the plan to redesign a biochemical plant in the city of Kirishi (Leningrad Oblast) stimulated designers to improve their engineering solutions regarding creating a waste-free and emission-free technology to produce nutrient microbiological protein. The numerous suggestions made during the process of the nationwide discussion of the "Main Guidelines of the Development of Protection of the Public Health and the Restructuring of Health Care in the USSR in the 12th Five-Year-Plan and in the Period up Until the Year 2000" made it possible to expand and individualize its public health subdivisions.

However, the success of environmental protection measures is largely dependent on changing the views of economic directors toward ecological problems.

To this day, the main reason for the stressed ecological and public health situation remains the irresponsible approach to environmental protection work by individual ministries and departments, the councils of ministers of certain union republics, and Soviet and national economic organs that, unfortunately, are continuing the fallacious practice of financing environmental protection with what is left over. The tempos at which measures to protect the environment are being implemented lag behind today's true requirements. The practical sanitary service comes up against inefficient organization of production processes, a low level of labor discipline, and a lag in ecological and hygiene standards on a daily basis.

The myth of the unprofitableness of environmental protection measures has not yet been dispelled. Of course these expenditures will always exceed incomes, as long as narrow departmental and local tendencies are preserved. If, however, the total amounts for reducing the losses related to environmental pollution are figured into the calculation (and, as is common knowledge, they reach many tens of billions of rubles each year), it will

become clear that protection is economically advantageous, especially since certain types of damage to the public's health and the status of the environment are irreversible.

Changes in the planning and financing of environmental protection measures should be a real step toward solving the ecological problems that have accumulated. The practice of planning from the level that has been achieved virtually nullifies the considerable efforts of the sanitary service and the capital spent on making the environment healthier.

The production quotas that industrial enterprises receive from their ministries frequently do not match their actual capacities. For this reason and also because of the ineffective use of cleaning equipment, even new facilities quickly find themselves in nonconformity with sanitary standards both from the standpoint of internal characteristics and from the standpoint of the external effect on the environment.

The practice of planning environmental protection measures on sector-by-sector basis has also turned out to be unsound. With the complex pollution that has come about and the combined effect of toxic substances on the environment, the implementation of uncoordinated environmental protection measures within a city or region does not generally have a perceptible result from the standpoint of improving the ecological situation overall.

An orientation toward extensive measures to control environmental pollution should receive a negative evaluation. Instead of developing low-waste and emission-free production processes, many industrial enterprises are increasing the height at which they make their emissions into the atmosphere, are planning the creation of "unlimited" sanitary-protection zones, etc. Today, all of these measures should be considered self-deception and should be categorically revised.

The ecological and public health situation that has evolved in the country has dictated the need to develop and implement a number of government measures to standardize environmental conditions. At the present time, with the active participation of the USSR Ministry of Health, a number of legislative decrees that lie at the foundation of the implementation of emergency measures and long-range programs in the area of environmental protection are being prepared. They are founded on the territorial principle of planning. The largest sums of capital investments that are currently possible are called for to implement measures to preserve the environment.

The USSR Ministry of Health is profoundly certain that it is already possible to achieve significant shifts in this direction today. This requires all-out improvements in production standards, labor and production discipline, and the quality with which environmental protection facilities and equipment are serviced and operated.

Fortifying the staffing of the environmental protection services should become an important step in improving all the work done in the country to preserve the environment. We must see to it that each worker of this service possesses a high level of professional knowledge and a high sense of civil duty. New ecological thinking and a high measure of responsibility (including material responsibility) should be developed in planners, scientific consultants, developers, designers, reviewers, production engineers, and other specialists actually participating in the creation and operation

of ecologically harmful types of production and technologies.

The successful implementation of the programs that have been stipulated by the Ministry of Health demands the significant activation of the human factor and will depend on making all USSR citizens aware of the how important and responsible daily work is in making the environment healthier.

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UDC 616.379-008.64-036.21

Epidemiology of Diabetes Mellitus in Some Regions of Uzbekistan

18400314 Tashkent MEDITINSKIY ZHURNAL UZBEKISTANA in Russian No 11, Nov 88 (manuscript received 15 Dec 86) pp 4-6

[Article by Ya. Kh. Turavulov, and T. K. Ibragimov, Scientific Research Institute of Regional Medicine, UzSSR Ministry of Health]

[Abstract] In the context of the all-union state program "Epidemiology of Diabetes Mellitus in the USSR"—in which the Scientific Research Institute of Regional Medicine, UzSSR Ministry of Health, was an active participant—the researchers set out to investigate and evaluate the incidence of diabetes mellitus in a number of regions differing in climatic and geographic features, to develop figures characterizing the entire republic, and to identify the effect of risk factors on the frequency of impairment of carbohydrate tolerance (ICT). In all, 15,100 individuals representing three regions—Tashkent, Khorezm

and Surkhandarin—were tested with the glucose tolerance test (GTT). Based on reported cases, the following diabetes incidence was found: Surkhandarin, 0.27 plus or minus 0.11 percent; Tashkent, 0.44 plus or minus 0.01 percent; and Khorezm, 0.22 plus or minus 0.11 percent. The incidence of manifest diabetes in the total population was 1.9 percent; latent diabetes, 2.1 percent; and questionable diabetes, 4.0 percent. The incidence of manifest and latent diabetes was found to be 1.8-fold higher among women than men; that of questionable diabetes, also higher among women, by a factor of 1.6. The highest levels of ICT were noted among older people, again higher among women than men. Incidence of diabetes was highest in Tashkent region (higher than in Khorezm by a factor of 2.6, and higher than in Surkhandarin by a factor of 1.7). This was explained by the growth in population employed in industry, by the mechanization of labor, and by occupational factors. Other risk factors considered were obesity, alcohol and tobacco consumption, liver-related problems, hypertension, and heredity. The figure for the incidence of diabetes in the republic was set at 1.88 percent. References: 8 (Russian).

UDC 577.212.3

Expression of HIV gag Gene Fragment in Escherichia Coli Cells

18400328a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 304 No 3, Jan 89 (manuscript received 18 May 88) pp 727-729

[Article by A. F. Bobkov, Ye. V. Kazennova, M. R. Bobkova, and M. M. Garayev, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] Conventional genetic engineering technology was employed for securing the expression of a fragment of the gag gene of HIV in *E. coli*. The experiments employed a HindIII fragment of HIV-1 genome isolated from plasmid pBH10 (supplied by R. Gallo, USA).

which encoded the 177 N-terminal amino acid sequence of protein p24 (one of the major HIV antigens) and the C-terminus of protein p17. The DNA segment in question was inserted at HindIII site on plasmid pUR290. Eventually, recombinant plasmids pHG37 and pHG72 were isolated from transformed clones of *E. coli* HB101. *E. coli* cells bearing these plasmids synthesized a 140 kD and a 165 kD protein; cells free of the recombinant plasmids did not produce these proteins. Immunoblotting technology was used to demonstrate that proteins with molecular weights of 140 kD and 165 kD reacted specifically with the antibodies isolated from an AIDS patient. Immunization of rabbits with lysates of cells bearing the pHG72 plasmid elicited antibodies reacting specifically with HIV proteins p17, p24, p47, p55, and p42, which are known to be encoded by the gag gene. Lysates of control cells did not induce antibodies with HIV-specificity. Figures 3; references 12 (Western).

UDC 612.014.646:613.16

Effect of Electrolysis Oxygen on Human Body

18402003 Kiev VRACHEBNOYE DELO in Russian No 1, Jan 89 pp 107-109

[Article by I. P. Kozyarin, Hygiene Department, Kiev Medical Institute]

[Text] The development of scientific-technical progress has resulted in a situation in which, during the process of their work activity (bridge construction, development of underwater marine resources, time in underwater craft and aircraft, etc.), a certain number of people are in hermetically sealed locations where an artificial gas atmosphere is created. One of the components of an artificial gas atmosphere that has a significant effect on the length of time that crews can spend in hermetically sealed rooms is the quantity and quality of gaseous oxygen used as the basis of human respiration (I. S. Breslav, 1981).

Crews in hermetically sealed objects may be provided with the necessary quantity of oxygen by on-board reserves, by obtaining oxygen from oxygen-containing substances, etc. (B. G. Grishayenkov, 1975; G. I. Meleshko et al., 1981; L. M. Yakimenko, 1981). However, the increase in the amounts of time for which humans stay in hermetically sealed locations has made it necessary to seek new methods of producing gaseous oxygen for respiration. The most promising method is that of the electrolysis of water, which may be implemented in an alkaline medium and on a solid polymer electrolyte (B. G. Grishayenkov, 1975; L. M. Yakimenko, 1981; N. I. Omelyanets et al., 1986). However, All-Union State Standard [GOST] 5583-78, "Gaseous Technical- and Medical-Grade Oxygen," does not permit the oxygen produced by the method of electrolysis of water in an alkaline medium to be used for respiration since, during the process of its derivation and compression in compressors with piston seals manufactured from fluoroplastic and other materials, the oxygen is contaminated with various chemicals that are hazardous to health. Biomedical research on the properties of electrolysis oxygen produced by the second method has just begun (I. P. Kozyarin et al., 1984; N. I. Omelyanets et al., 1986).

The present communication presents a biomedical assessment of gaseous oxygen produced by the electrolysis of water in a system with a solid polymer electrolyte. As our previous research has shown (I. P. Kozyarin et al., 1984; N. I. Omelyanets et al., 1986), with the exception of the water vapors included in it, electrolysis gaseous oxygen produced in a system with a solid electrolyte conforms to GOST 5583-78. The volume fraction of oxygen formed depends on the chemical composition of the water and does not depend on the unit's operating time or mode. In view of the restrictions on using electrolysis gaseous oxygen for respiration and medical purposes that currently exist in GOST 5583-78, we

conducted several series of experiments on white rats and guinea pigs to study the effect of electrolysis gaseous oxygen on the body. The results of the research showed that electrolysis gaseous oxygen produced in a system consisting of distilled water and two specimens of water containing different chemicals of organic and inorganic origin in a 1:4 mixture with gaseous nitrogen does not cause any morphological or functional changes in the body.

Since the species sensitivity of animals and humans to the effect of unfavorable environmental factors differs, we studied the effect of a 1:4 mixture of electrolysis gaseous oxygen and gaseous nitrogen on vitally important human systems and the possibility of using it for respiration and medical purposes. Three series of observations were conducted on volunteers. In the first series, the effect of a gas mixture of gaseous nitrogen and electrolysis gaseous oxygen produced from distilled water no. 1 was studied. In the second and third series were studied a mixture of gaseous nitrogen and electrolysis gaseous oxygen obtained from distilled water no. 2 and no. 3, which contained different concentrations of organic and inorganic chemicals. Ten volunteers who were for practical purposes healthy participated in the experiment. They were males between the ages of 20 and 27 who were not active athletes.

The method of conducting the research entailed feeding a gas mixture of electrolysis gaseous oxygen with nitrogen directly into a volunteer's respiration zone through a special mask. The volunteer breathed the mixture for 30 minutes. Studies were conducted before the start of the experiment (background indicators), then once every 10 minutes during the period in which the gas mixture was inhaled, and 5 minutes after inhalation of the mixture ceased.

Indicators of external respiration (frequency and nature of breathing), activity of the cardiovascular system (heart rate), arterial pressure, electrocardiography, and central nervous system indicators (a correction test based on V. Ya. Anfimov's table) were used to assess the functional status of the volunteers' bodies. The aforementioned physiological systems of the volunteer's bodies were sampled because of their vital importance for respiration, high sensitivity to a change in environment, and close connections with the conditions under which oxygen is provided to the body (M. Ye. Marshak, 1961; M. M. Khonanashvili, 1978; I. S. Breslav, V. D. Glebovskiy, 1981).

Determining the frequency and nature of respiration makes it possible to discover the reflex effect of an irritant on the respiratory tract. Electrocardiography makes it possible to discover processes of excitation and conduction in the heart, impairments of autonomic regulation, and mineral metabolism. Comparing ECGs and arterial pressures makes it possible to isolate the vascular component of possible impairments in blood circulation.

Using V. Ya. Anfimov's letter correction tables when studying the functional status of the central nervous system provides an idea of the rate of the principal nervous processes of excitation, inhibition, and differentiation in the cerebral cortex in response to the effect of the gas mixture under study.

Respiration frequency was determined on the basis of the number of movements made by the chest cavity per unit of time (min, 1), and the heart rate was measured by an ECG, which was recorded in the second standard lead by using a portable electrocardiograph. The values of the systolic and diastolic arterial pressures were determined by using Korotkov's auscultation method with a Riva-Rocci tonometer (T. I. Kositskiy, 1959). The systolic, diastolic, pulse, and mean dynamic arterial pressures were considered. During the investigation of the functional status of the central nervous system using V. Ya. Anfimov's letter correction tables, assessments were made of the number of all characters examined, the number of errors every 30 seconds of the test, and the drawing of one letter during the course of 1.5 minutes and then another in the same amount of time.

As the research results indicated, inhaling a gas mixture containing electrolysis gaseous oxygen obtained from different liquids does not have a negative effect on volunteers' hemodynamics (heart rate, arterial pressure) and does not change the nature and frequency of external respiration. The observed fluctuations in individual indicators were within the allowable limits (up to 10 percent) and were irregular in nature.

The amplitude of the P₁, R, and T waves in the second standard lead was estimated first of all during assessment of the status of the cardiac activity (based on ECG data) of each person examined. The results of the studies showed that the P₁ wave, which characterizes the electrical changes during the excitation of the auricle, did not change when the gaseous mixtures were inhaled. Neither did the amplitude of the R and T waves, which indicate the degree of excitation of the ventricles. Thus, the amplitude of the R wave reached a maximum of 1.04 to 1.08 mV when all of the gas mixtures were inhaled and did not deviate from the initial values significantly. Nor were any deviations detected in the position of the volunteers' ST segments relative to the isoline (which determines the degree of oxygenation of the ventricles and the electrical stimulation of the heart at the moment when and after the gas mixtures were inhaled) when compared with the initial data.

The study of the higher nervous activity of those examined that was conducted by using V. Ya. Anfimov's letter correction tables confirms that in all of the volunteers the indicators were virtually unchanged from the initial values. Replacing the configuration by the method of drawing letters did not result in significant changes in labor productivity, which indicates the unchanged mobility of nervous processes.

Thus, by virtue of the research conducted, it is possible to conclude that, based on sanitary-chemical indicators, electrolysis oxygen obtained from different types of water in a system with a solid polymer electrolyte conforms to GOST 5583-78, "Gaseous Technical- and Medical-Grade Oxygen," and to the International Standard "Gaseous Oxygen for Life Support Systems on Board an Aircraft" and does not have a negative effect on the human or animal body. Electrolysis gaseous oxygen in an air-and-gas mixture with gaseous nitrogen (1:4) may be recommended for use in hermetically sealed locations for breathing since it does not have a negative effect on the body of animals or on the functional status of the respiratory and cardiovascular systems and higher nervous activity of humans.

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UDC 591.104

Nonspecific Intraperitoneal Immunization

*18400291b Moscow IZVESTIYA AKADEMII NAUK
SSSR: SERIYA BIOLOGIYA in Russian
No 6, Nov-Dec 88 pp 922-923*

[Article by L. A. Piruzyan, Institute of Chemical Physics,
USSR Academy of Sciences, Moscow]

[Abstract] Experimental studies were conducted on the establishment of a high level of peritoneal immunity in

mice through the creation of a depot of inflammatory cells between the parietal and visceral serosal membranes. A sterile focus of inflammation was created by introduction of either sterile meat-peptone broth or 10% medical gelatin, a process that leads to the appearance of at least 80×10^6 protective cells within 3 h. Subsequent intraperitoneal challenge with 4×10^8 staphylococcal cells ("Zhayev") resulted in 80% mortality over 4 days in control mice, while the mortality figures for the protected mice was 10-15%. Since protection was afforded before the onset of antibody response, the exact nature of immunity provided by this technique remains to be elucidated.

UDC 617.7-001.15-057+613.645-06:617.7] (049.32)

V. A. Kashuba Review of 'Eye Injuries Caused by Light'

18400203 Moscow GIGIYENA TRUDA I PROFESSIONALNYYE ZABOLEVANIYA in Russian No 9, Sep 88 pp 56-57

[Review by V. A. Kashuba of book "Eye Injuries Caused by Light" by P. V. Preobrazhenskiy, V. I. Shostak, L. I. Balashevich, Leningrad, Meditsina, 1986, 900 copies, 200 pages]

[Text] A book has been published in which the interaction of the eye with high-intensity natural and artificial light sources is described in detail for the first time. Widespread use in the national economy of more and more powerful welding apparatus, projectors, mercury-quartz lamps, xenon lamps, ophthalmocoagulators and lasers frequently leads to functional shifts and organic injuries to persons' eyes. The authors of this book present a rather extensive survey of new data concerning present-day ophthalmoscopic instruments and surgical illuminating lamps and microscopes, including devices employing fiber optics, that can cause light-induced injuries to the eyes of patients during examination or surgery. They look at these injuries from the standpoint of light energetics only, although it would also be possible to discuss the photosensitizing role of drugs.

Hygienists should pay especially careful attention to the sections concerning biophysical mechanisms of the interaction of the eye and specific magnitudes of intense light irritants, the mechanism of temporary blinding, the disadapting effect of strobing, and the description of eye injuries resulting from exposure to electromagnetic radiation of the optical range of the spectrum and methods and means of preventing these injuries. The data presented are important for hygienic regulation of different forms of optical radiation. The authors should have followed a critical approach in assessing existing classifications of the spectrum of the optical range of electromagnetic radiation, primarily in the portion associated with determination of the boundary of invisible infrared radiation.

The authors examine the present-day mechanisms of temporary blinding following exposure to brief, intense flashes of light in terms of interpretation of processes of functioning of receptor formations and neurodynamic shifts of the retina with consideration of interneuronal interaction at all levels of the visual system, primarily of the cerebral structures of the visual analyzer. In its physiological essence, temporary blinding is the disadaptation of the visual system. It is manifested in changes of interaction between afferent systems, in deviations from certain physiological laws, for example, and distortions of color perception. Distortion of subjective color sensations is, in the opinion of the authors, one of the specific features of experimental light effects on the human visual system. The color red is perceived most

persistently by the eye, and, obviously, it is no coincidence that it is used to signify emergency or interdiction. The authors assign a decisive role in processes of temporary blinding to peripheral mechanisms, that is, retinal mechanisms. At the same time, they do not consider the possibility of direct penetration of low-intensity laser radiation and light from ordinary sources through the eyes, retrobulbar tissue and bone of the skull to specific brain structures.

The authors extended and expanded existing knowledge concerning injuries to the eye by visible, infrared and ultraviolet light radiation, by laser beams and by the light from an atomic explosion, and they described the clinical picture of such injuries. They consider laser radiation to be most dangerous to the eye, and they consider the biological effects due to pulsed lasers to be specific. They consider wavelength, intensity and duration of exposure to be the leading parameters of light (or radiation) in terms of its injurious effect. The authors discuss photochemical, thermal and photomechanical mechanisms of eye injury, and they point out the connection between some eye diseases and the action of light. Data concerning non-thermal methods of energy transfer by irradiated tissues and data concerning the possibility of damage to the retina in the prolonged exposure to light of moderate intensity not sufficient to produce a burn are of special interest.

Chapters 3 and 4 describe diagnostic and therapeutic use of intense light and laser effects on the eye, which is of interest to occupational pathologists and for the purposes of occupational screening and medical expertise, as well as for the prevention and treatment of photoinjuries to the eyes of healthy persons and victims of diseases, in whose origin the effect of light is significant. The authors properly associate progress in laser technology with further development of methods using intense light in eye therapy, which now are becoming an independent and promising trend in ophthalmology. Discussing different aspects of the search for new areas and methods of using laser radiation, they also emphasize the necessity of producing portable ophthalmocoagulators and creating laser offices in polyclinics and rayon hospitals. However, they do not discuss the practical and hygienic aspects of organization of these kinds of subdivisions in health care institutions, although the literature contains such information. Recommendations of the authors concerning prevention of light-induced injuries caused by ophthalmological devices deserve attention, although they contain no information concerning new design solutions relating to this kind of apparatus nor any means of collective protection of personnel from reflected laser radiation. The authors did not pay enough attention to problems of binocular interactions.

Materials in the monograph are important for assessment of occupational sensory activity under conditions of brief and super-powerful light effects and during work in actinic light. However, hygienists need experimental data concerning long light strobings. There is no doubt that the approach to assessment of shifts produced from

the point of view of the whole body is advisable. Only sequential, complex assessment of visual, photoautonomic, optical and other effects of the eye enables the explanation of many unclear aspects concerning its interaction with light and to solve—not empirically, but from a scientific standpoint—problems of prophylaxis and diagnosis and treatment of existing injuries.

The authors of the book, two ophthalmologists and a physiologist, are right in considering this to be an important book for hygienists. The facts presented by them

reflect the inadequacy of hygienic regulation of the contact of man with present-day intense light sources and serve for us as a warning signal which calls for serious measures to protect people's health. We cannot forget that the sun not only produces light but it also blinds. The book can be useful to opticians, technicians and many other specialists working with radiation of the optical range of the spectrum.

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UDC 576.8

Long-Term Anabiosis of Sporogenic Bacteria Isolated from Central Antarctic Glacier

18400291a Moscow *IZVESTIYA AKADEMII NAUK SSSR: SERIYA BIOLOGIYI* in Russian
No 6, Nov-Dec 88 pp 885-891

[Article by S. S. Abyzov, N. F. Kirillova, and G. V. Cherkesova, Institute of Microbiology, USSR Academy of Sciences, Moscow]

[Abstract] Conventional methods of bacteriology were employed in studies on sporogenic bacteria isolated from deep-core samples of glaciers in the Antarctic. Analysis of the isolates obtained from depths of 0 to 320 m (covering a time span of 12,500 years) led to the identification of a variety of *Bacillus* species (and one *Clostridium aurantibutyricum* isolate at 150-160 m). With increasing depth the percentage of nonsporogenic bacterial species decreased (52% of the isolates to 100 m; 16% at 100-200 m; 7% to 300 m). After a prolonged period at -55 to -57°C the rate of physiologic processes of the isolates were much slower than normal, with enzymatic reaction rates 2- to 3-fold lower than expected. However, maximum growth was obtained at 40-50°C (range 4 to 50°C), unlike the growth pattern usually displayed by mesophilic sporogenic bacteria. Subsequently, reversion to normal physiological and metabolic behavior patterns proceeded rapidly on reculture. These observations pointed to the value of deep-core samples as a source of ancient terrestrial microbial life

forms and, perhaps, forms of extraterrestrial origin as well. References 33: 16 Russian, 17 Western.

UDC 616.98:579.843.95]-078.73

Quantitative Determination of Specific Activity of Luminescent Plague Immunoglobulins Using Pulsed Flow-Type Cytofluorimetry

18400315 Moscow *LABORATORNOYE DELO* in Russian No 12, Dec 88 (manuscript received 31 Aug 87) pp 59-62

[Article by A. L. Kravtsov, S. A. Korovkin, and A. V. Naumov, All Union Scientific Antiplague Institute "Mikrob," Saratov]

[Abstract] Luminescent plague immunoglobulins (LPI) are used in diagnosing plague cases. The authors report their development of a rapid, quantitative test for specific activity of LPI. The test is based on automatic determination of the intensity of immunofluorescence of individual bacteria in the sample with a pulsed, flow-type cytofluorometer. This apparatus, unlike a luminescent microscope, is a sensitive, high-performance unit that evaluates LPI preparations at a rapid pace (hundreds of thousands of bacterial cells per minute). Its speed (8-10 min per test) comes from eliminating the need to wash the bacteria—the immunofluorescence intensity is measured right in the LPI solution. The measurements produced by this method are comparable to those obtained by a luminescent microscope, but they are produced much more quickly. References: 4 (Russian).

UDC 611.892:612.426:599.323.4

Response of Rat Spinal Ganglion Ultrastructures to Pulsed Electromagnetic Field

18400310 Leningrad ARKHIV ANATOMII, GISTOLOGII I EMBRIOLOGII in Russian Vol 95 No 11, Nov 88 (manuscript received 25 Apr 88) pp 38-42

[Article by L. M. Merkulova, and L. A. Sysoyeva, Department of Histology and General Biology and Department of Military Field Surgery and Civil Defense, Chuvash State University, Cheboksary]

[Abstract] The goal of this work was to establish the nature of ultra-structural changes in rat spinal ganglia after exposure to a pulsed electromagnetic field. Experiments were performed on white male rats exposed to a 100 mT pulsed electromagnetic field for 1, 3, 5 and 10 days, 15 min per day. Pulse duration was 0.2×10^{-3} sec, with a duty factor of 16 times per minute. It was shown that a single 15-min exposure resulted in organelle changes in light neurons. In general, significant morphological changes were observed in neurons, gliocytes and blood vessels in the spinal ganglia of the animals. The effects were a function of the number of exposures to the field: initially only cytoplasmic structures were affected; repeated exposures led to alterations in nuclear structures. Blood vessel endothelia showed an early, marked response to the field. The observed changes were reversible, with the time required to achieve full regeneration

of normal ultrastructure directly related to the number of exposures to the electromagnetic field. Figures 2; references: 11 (Russian).

UDC 612.821.6

Possibility of Development of Positive and Inhibitory Conditioned Reflexes to Alternating Magnetic Fields in Rats

18400333c Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I.P. PAVLOV in Russian Vol 38 No 5, Sep-Oct 88 (manuscript received 15 Jun 87) pp 969-970

[Article by N. N. Partskhaladze, Institute of Physiology imeni I. S. Beritashvili, Georgian SSR Academy of Sciences, Tbilisi]

[Abstract] Male and female Wistar rats were used to determine whether inhibitory (negative) conditioned reflexes can be established to an alternating magnetic field, in addition to positive responses. The experimental approach utilized pain avoidance with a 61 kHz alternating magnetic field used as the positive conditioned stimulus, and a 12kHz field as the negative stimulus. The pain avoidance data demonstrated the establishment of both positive and negative conditioned reflexes to the alternating magnetic fields. These observations both confirmed previous reports on positive conditioned reflexes with alternating magnetic fields and expanded the knowledge base by providing evidence for the use of such fields as negative conditioned stimuli. References 5: 3 Russian, 2 Western.

UDC 615.917:615.285.7].099

Case of Acute Poisoning by Methyl Chloroformate

18400204 Moscow GIGIYENA TRUDA I
PROFESSIONALNYYE ZABOLEVANIYA in Russian
 No 10, Oct 88 (manuscript received 6 Mar 87) pp 57-58

[Article by A. A. Penkovich, V. V. Anikin, Institute of Labor Hygiene and Occupational Diseases, Gorky]

[Text] Methylether of chloroformic acid, or methyl chloroformate (MCF), is used in organic synthesis and also as an admixture to HCN in aerosols for pest control and is a potent irritant of the respiratory tract and conjunctiva even in concentrations of 5 mg/m³. Deaths resulting from acute methyl chloroformate poisoning have been reported. Methyl chloroformate poisoning is accompanied by pulmonary edema, secondary bronchial pneumonia, tracheobronchitis, and bleeding in the stomach mucosa and duodenal mucosa.¹ A case of acute methyl chloroformate poisoning observed by us is worthy of attention.

Patient N., 46 years old, entered the clinic at the Gorky Scientific Research Institute of Labor Hygiene and Occupational Diseases on 17 December 1986. A considerable amount of methyl chloroformate fell upon his clothing while he was repairing an MCF pipeline. Some of it soaked through the clothing onto the skin of his back, and patient N. experienced itching and burning sensations. There were no symptoms of respiratory distress since he was wearing a respirator while working. While in the shower, where he was sent to wash off any liquid remaining on his skin, he noticed a pungent, suffocating odor coming from his contaminated clothing. He experienced a sharp pain in his eyes, lacrimation, and a tickling in the throat, and he began coughing. These conditions lasted for a total of 3-5 minutes. Over the next 4-5 hours, he felt alright. He did not seek medical care. Later, after returning home, he began to experience pain and a burning in his throat. He experienced chills and dyspnea and developed a cough that produced a small amount of mucous sputum. The medical personnel at the treatment-and-prevention facility to which the man went did not consider his condition to be very grave and, after giving him calcium chloride and dimedrol, sent him home. After those measures, the man's condition improved; but after some time, the symptoms mentioned above worsened. When the dyspnea began to progress and the cough worsened, he was taken to the clinic 22 hours after the incident.

Objective examination revealed a body temperature of 37.1°C. The patient was lucid, and the skin was clean, with ordinary color, and was quite moist. Throat and mouth were hyperemic, as were the vessels of the posterior wall of the pharynx. Pulmonary respiration was somewhat reduced, and a considerable amount of moist, fine bubbling rales were heard in the inferolateral sections of both lungs. Respiration rate was 20 per minute. Heart sounds were rhythmic, dull. Heart rate was 90 per

minute, and arterial pressure was 135/80 mm of mercury. The abdomen was soft and not sensitive. Neither liver nor spleen was enlarged. Blood analysis revealed Hb 149 g/l, erythrocytes $5.05 \times 10^{12}/l$, color index 0.89, leukocytes $11.6 \times 10^9/l$, platelets 3%, plasma 87%, electrolytes 2%, lymphocytes 5%, monocytes 3%; ESR 3 mm/hour.

X-ray studies of the chest on the day of admission showed heterogeneous reduction of transparency of lung tissue due to highly pronounced amplification of the lung pattern throughout the middle and lower pulmonary fields on both sides and multiple small-focal and medium-focal shadows, with a tendency towards fusion. Roots were expanded and unstructured.

Data from the anamnesis, the clinical course of the disease and results of radiological study provided the basis for diagnosis: acute poisoning from inhalation of methyl chloroformate vapors and pulmonary edema.

The patient's condition improved by evening after treatment with prednisolone, eufillin and lasix intravenously. Twenty-four hours after hospitalization, respiration was harsh; rales were not heard. Respiration rate was 12/min. Heart sounds were rhythmic and clear; heart rate, 72 beats per minute; arterial pressure, 120/80 mm of mercury. X-rays showed pronounced positive dynamics in the form of reduction of intensity of shadowing and highly amplified lung pattern. On the 3d day after hospitalization, x-ray pictures showed a pulmonary field without focal or infiltrative changes. Single small-focal shadows were differentiated in the middle sections, and the roots are structured.

The observation indicates that even brief exposure to low concentrations of methyl chloroformate (based on possible entry through the skin) may produce toxic pulmonary edema, with a latent period (4-5 hours in this case). This may be accompanied by slightly pronounced irritation of the conjunctiva and upper respiratory tracts. Therefore, a person who has been exposed to the action of methyl chloroformate should be kept under medical observation for 12-18 hours, after which he may be released if there are no signs of developing pulmonary edema. Conclusions:

1. Methyl chloroformate vapors produce a brief, pronounced irritating effect on the upper respiratory tracts and conjunctiva.
2. In the acute action of even relatively low concentrations of methyl chloroformate vapors, pulmonary edema may arise after a period of seeming well-being.

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UDC 615.917'558.1-036.11-06:616.89

Mental Disturbances at Acute Stage of Household Organophosphorus Poisoning

18400342b Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 8, Aug 88 pp 38-39

[Article by Professor V. K. Smirnov, A. V. Rustanovich and K. A. Pozamantir]

[Text] Investigation of mental disturbances in the symptomatology of poisoning by organophosphorus compounds (OPC) is an important task for military psychiatry. It is known from the literature that cases poisoning caused by this group of agents constitute 10-25 percent of all household cases of poisoning in peacetime (Yu. F. Barsukov, 1980; Ye. A. Luzhnikov, 1982). Mental disorders are found in 62-100 percent of patients with acute OPC poisoning (I. M. Chetvertak, 1976; L. D. Sadovnikova et al., 1980). The importance of studying mental disturbances in the acute period is attributable to their high prognostic relevance to the outcome of the poisoning (Ye. A. Churkin, 1981), as well as the substantial effect of mental state on tactics of therapy, in particular, on the extent of atropinization.

At the same time, in the opinion of some authors (R. L. Kazakevich, L. M. Shamrey, 1981), mental disorders are the least-studied manifestations of poisoning. Psychopathological phenomena are sometimes considered together with neurological ones, and sometimes as derivatives of the latter. There are no criteria that would permit distinct differentiation between mental disturbances caused specifically by the toxic effect of OPC and those that are the consequences of instituted cholinolytic therapy. In our opinion there is not enough coverage in the literature of the clinic and dynamics of mental state in the presence of severe and extremely severe poisoning, the prognosis of which is not considered absolutely unfavorable at the present time, thanks to new methods of sorption detoxification and specific antidote therapy.

Of the proposed classifications of mental disturbances in the acute period of household OPC poisoning, the one developed by L. D. Sadovnikova and Ye. A. Churkin (1981, 1982) has gained the most popularity; according to their classification, a distinction can be made, according to genesis, among psychoses caused by the effects of OPC: intoxication, atropine and alcoholic psychoses. In turn, three leading syndromes are singled out in the structure of the first group: psychovegetative, psychovestibular and hyperkinetic. It is believed by L. D. Sadovnikova (1976) that mental disorders associated with acute OPC poisoning are characterized primarily by dreamlike states of impaired consciousness in the context of delirious, oneiric or oneiroid syndromes.

Our objective was to investigate the clinic and dynamics of mental disorders at the acute stage of OPC poisoning as related to severity of poisoning. For this purpose, we examined a group of patients (47.7 percent men and 52.3

percent women) under treatment in a specialized treatment facility. Most (82.6 percent) were under 50 years of age, and 39 percent of them were under 30 years of age. Moderate poisoning was diagnosed in 36.4 percent of the cases, and severe in 40 percent. In 72.3 percent of the cases, poisoning was due to malathion, and in 20.5 percent, to chlorophos. Both agents are esters, of dithiophosphoric and phosphonic acids, respectively. The mechanism of their toxic action is attributable mainly to impairment of catalytic function of acetylcholinesterase; however, the direct cholinomimetic effect and non-cholinergic mechanisms of action of OPC also have some significance. In the course of the study, the results of psychological analysis were compared with the severity of general manifestations of poisoning and results of laboratory tests (activity of blood plasma and erythrocyte cholinesterase).

Mental disturbances were noted in all patients. Their severity ranged from special, so-called asthenic disorders, to clouded consciousness or loss of consciousness. In assessing the psychopathological manifestations, one must take into consideration the effect of atropine therapy which was prescribed for all patients immediately after the diagnosis was made. Atropine psychosis was observed in 37.4 percent of these cases. The clinical signs of poisoning depend also on the patient's mental state prior to poisoning. In 76.4 percent of the cases, poisoning was due to attempted suicide. Some of the patients (53.3 percent) ingested the poison while inebriated, and 27.7 percent of them were found to be chronic alcoholics. Some (21 percent) had been treated previously for different mental illnesses.

Thus, in the structure of mental disorders at the acute stage of OPC, one must differentiate disturbances due primarily to the toxic effect of OPC, to the influence of atropine therapy, and to prior mental illness.

Mental disturbances due directly to the toxic effect of OPC are demonstrable several minutes after ingestion of the poison. They are characterized by distinctive impairment of consciousness manifested by symptoms of "paucity" of mental activity and its nonproductivity, narrowing of the "field" of consciousness, heightened exhaustibility of the psyche, sense of anxiety and fear or, on the contrary, indifference, calmness, and "disconnected" emotions. Episodes of psychomotor excitement alternate with periods of motor inhibition and adynamia. In cases of severe and extremely severe poisoning, the above signs progress and a soporose (comatose) state occurs 30-120 min after poisoning. Its duration is directly related to severity of poisoning, and it is one of the most informative indicators with respect to prognosis. Early (within the first 2-6 h) use of methods of sorption detoxification (hemosorption, etc.) reduces significantly the effect of the poison. Absence of signs of regaining consciousness after hemosorption (particularly when repeated) is indicative of a poor prognosis.

In cases of moderate poisoning, at the height of intoxication most patients present varying degrees of stupor:

generalized inhibition, impaired orientation in time and place, dramatic rise of threshold of perception of external stimuli, inability or difficulty in comprehending occurring events. The severity of consciousness impairment depends on time of day and intensity of therapeutic measures administered. Against such a background or at the stage of coming out of the stuporous state, episodes of clouded twilight consciousness are frequently observed. They are distinguished by short duration, marked automatism of actions, profound disorientation in the surroundings and total loss of memory covering the period of poisoning.

In the case of positive dynamics of the illness associated with moderate poisoning, diminished mental activity, signs of adynamia, abulia, and diminished concentration move to the fore in the clinical picture, which makes it difficult to make contact with the patient and causes impairment of orientation in terms of time and events that are occurring. Recollections about the period of poisoning is fragmentary and disjointed. This state is one of the forms of impaired consciousness typical of OPC poisoning. In terms of its mechanisms, it shares a number of features with both a state of "waking coma" and some variants of asthenia with "paucity of consciousness," as well as with "oriented twilight states."

The syndromic distinctions of the signs we observed appear to be quite definite. In the presence of the above psychopathological manifestations of poisoning, psycho-sensory disorders with impaired perception of one's own body and surroundings are not uncommon. Upon further improvement of the patient's condition, asthenic disorders become prominent, and they can last two or more months after poisoning.

The severity of mental disturbances elicited directly by the toxic action of OPC is rather distinctly correlated with severity of poisoning and extent of decline of activity of blood plasma and erythrocyte cholinesterase.

Delirious states, which were observed in 37.4 percent of the patients, usually developed after administration of cholinolytics, or else they were attributable to chronic alcohol intoxication prior to poisoning. This was indicated by data in the history, time of onset of atropinization and its duration after this state was achieved, as well as absence of a parallel in relation to the general severity of poisoning and extent of depression of cholinesterase activity.

The effect of anticholinesterase agents is manifested by the fact that the content of hallucinatory experiences is often characterized by a single subject and relatively successive onset. The mood in the so-called atropine deliria is most often elevated on the order of euphoria, with prevalence of the affect of curiosity, amazement and sometimes benevolence.

Thus, mental disturbances are observed in all patients with acute poisoning by organophosphorus compounds. The mental disorders caused directly by OPC are characterized mainly by such forms of consciousness

pathology as coma, sopor, stupor, twilight states, depleted consciousness, oneiroid episodes and special asthenic states. Their severity is distinctly related to general severity of poisoning, which enables us to view psychopathological disorders as one of the criteria of severity of poisoning and its immediate prognosis. The delirious states observed in cases of acute OPC poisoning are attributable to atropine therapy or existing mental illness. In each case they require thorough differential analysis and correction of therapy.

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Study of the Mechanism of Vasoactive Effects of Verapamil and Crown Ether Derivative

18400303 Moscow FARMAKOLOGIYA I

TOKSIKOLOGIYA in Russian

Vol 51 No 6, Nov-Dec 88 (manuscript received

29 Dec 88) pp 45-48

[Article by K. G. Gurbanov, G. V. Kovalev, N. G. Lukyanenko, and S. S. Basok, Department of Pharmacology, Volgograd Medical Institute, Physical-Chemical Institute imeni A. V. Bogatskiy, UkrSSR Academy of Sciences, Odessa]

[Abstract] The goal of this study was to investigate the vasoactive mechanism of action of calcium antagonist verapamil and a crown ether derivative benzylazacyclo-15-crown-5. Experiments were performed on 23 anesthetized cats (50 mg/kg i.p. sodium pentobarbital). It was shown that both verapamil (0.5 mg/kg) and the crown ether derivative (9 mg/kg) blocked the appearance of pressor response of perfusion pressure in the femoral artery upon stimulation of the femoral nerve; they exhibited no effect on pressor response, however, after administration of noradrenaline, tyramine, and angiotensin amide. The authors explain this by concluding that verapamil and the crown ether suppress pressor response due to calcium-dependent processes and specifically block the release of endogenous noradrenaline. Both preparations produce a vasodilating effect as a result of the diminished calcium-dependent release of noradrenaline from sympathetic nerve endings. Figures 3; references 19: 8 Russian, 11 Western.

UDC 577.153.4

Anticholinesterase Activity of Alkaloid Iodomethylates

18400328c Moscow DOKLADY AKADEMII NAUK

SSSR in Russian Vol 304 No 3, Jan 89 (manuscript received 26 May 88) pp 746-748

[Article by G. M. Grigoryeva, A. A. Abduvakhabov, I. I. Krasnova, A. Ye. Khovanskikh, D. N. Dalimov, and A. S. Sadykov (dec.), Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR

Academy of Sciences, Leningrad; Institute of Biorganic Chemistry, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] The demonstration that many natural alkaloids are efficient inhibitors of cholinesterase (ChE) led to a study of this class of compounds as probes of enzyme active centers. Accordingly, an analysis was conducted of the effects of the following iodomethylates on ChE, acetylcholinesterase (AChE), and butyrylcholinesterase (BChE): morpholine, piperidine, 2,4- and 2,5-lutidine, salsoline, anabasine, and cytisine. The iodomethylates were shown to function as competitive inhibitors of the enzymes in question, which indicates that they reacted with the active centers. Since these inhibitors contain an ammonium group, they evidently bind to an anionic site. Evaluation of the inhibition constants demonstrated that inhibitory activity increases

with the hydrophobicity of the alkaloids up to a point, depending on the enzyme. Morpholine iodomethylate was shown to be the weakest inhibitor for all three enzymes on the basis of high K_i values. 2,5-Lutidine iodomethylate, on the other hand, was shown to be selective for fly ChE with a K_i of 1.4×10^{-7} M. The anionic site in ChE has been shown to have the most hydrophobic environment, while that of BChE has the least hydrophobic. Assessment of the structural features of the inhibitors and the K_i values showed that ChE possesses the largest cleft in the area of the anionic center, and AChE and BChE a less spacious cleft. On balance, the iodomethylates of the alkaloids under consideration have been shown to be valuable probes for studies on the active sites of cholinesterases. References 9: 7 Russian, 2 Western.

UDC 615.31:[547.95:547.943].03:616.3

Dalargin (Opioid Hexapeptide) in Pathogenetic Therapy of Digestive Organ Disorders

18400289a Moscow SOVETSKAYA MEDITSINA in Russian No 10, Oct 88 (manuscript received 20 Oct 87) pp 59-63

[Article by V. A. Vinogradov and N. P. Buglak, Simferopol Medical Institute]

[Abstract] The demonstration that endogenous opioids have systemic significance and that they and their specific receptors have been found in the digestive system have impelled studies of their role in the pathogenesis of digestive organ disorders. In the USSR extensive studies have been conducted with the synthetic hexapeptide dalargin, an analog of leu-enkephalin, which has been demonstrated to possess antistress potential; function as an anti-inflammatory, anti-ischemic, and immunoregulatory agent; and inhibit lipid peroxidation, one of the key mechanisms underlying many pathologic changes. Based on animals studies showing that dalargin inhibits pancreatic secretion of enzymes, therapeutic trials were conducted with 56 patients suffering from acute pancreatitis. The results were positive, with the progression of pancreatitis to more advanced stages halted. Experimental studies on cysteamine-induced gastrointestinal ulcers found confirmation in human trials in which dalargin was found beneficial in peptic ulcers, at least in part as a result of its normalization of gastric acid secretion. Further animal studies demonstrated that dalargin accelerates wound healing by 20% in a dose-dependent manner on both local application and intraperitoneal administration. Evaluation of the endocrine sequelae of dalargin administration to patients with duodenal ulcers showed that, in that respect, dalargin was innocuous, unlike cimetidine, which sharply increased prolactin secretion. Dalargin, therefore, has been shown to be an effective cytoprotective agent in a dose-dependent manner with apparently minimal side effects. References 44: 38 Russian, 6 Western.

UDC 615.784:615.785.4

Regional Heterogeneity of Muscarinic Choline Receptors

18400328d Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 304 No 3, Jan 89 (manuscript received 10 May 88) pp 749-752

[Article by A. F. Danilov, I. I. Nedoma, S. F. Tuchek, and S. A. Shelkovnikov, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad; Institute of Physiology, CzSSR Academy of Sciences, Prague]

[Abstract] The demonstration that muscarinic receptors may be subdivided into two subtypes (M_1 and M_2), as well as the fact that the effects of gallamine and of other myorelaxants are more pronounced in the heart than in

other smooth muscles, led to a comparative analysis of the binding parameters exhibited by the longitudinal muscle of the small intestine and the atrium of the rat for a series of myorelaxants. Using the conventional cholinergic furtretonium, ritetronium and tercuronium were seen to be equally effective in blocking the effects of furtretonium on the heart and the intestine. Gallamine, alcuronium, and pancuronium were far more potent in the atrium than in the intestine, while tubocurarine and decamethonium failed to block the effects of furtretonium in both areas. Furthermore, radioligand binding studies demonstrated that the myorelaxants in question inhibited the binding of tritiated quinuclidinyl benzylate to both the intestinal and cardiac receptors. In addition, an equivalent concentration of alcuronium was shown to increase the binding of tritiated N-methylscopolamine to both the cardiac and intestinal muscarinic receptors, without an increase in the number of binding sites, according to Scatchard plots. The fact that atropine exerted identical effects in binding to the intestinal and cardiac preparations, as well as the results with the myorelaxants that differentiated between the two tissues, suggests that, in the latter case, allosteric binding is involved rather than actual differences in the muscarinic receptors of the heart and the intestine. Figures 1; references 11 (Western).

UDC 612.822.1

Effects of Enkephalin-Like Tetrapeptidamide on Functional Indicators of Brain Formations

18400333a Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. P. PAVLOV in Russian Vol 38 No 5, Sep-Oct 88 (manuscript received 30 Jun 87) pp 905-913

[Article by O. S. Adrianov, L. M. Gershteyn, N. S. Popova, and Ye. L. Dovedova, Laboratories of Conditioned Reflex Morphophysiology and of Cytochemistry, Brain Institute, All-Union Mental Health Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Trials were conducted with tetrapeptidamide (TPA; try-d-ala-gly-phenylala-NH₂) on outbred rats, chinchilla rabbits, and dogs to further define the mechanism of action of opioids on the CNS. Correlation of electrophysiological, behavioral, and histochemical observations demonstrated a similar spectrum of activity by TPA in all three species, pointing to the biological "universality" of this peptide. Within 8-10 min of i.m. administration of 500 µg/kg TPA, a marked analgesic effect was seen, unaccompanied by any alterations on the EEG. EEG depression and suppression of evoked potentials to light flashes were the effects seen 30-40 min after TPA administration, as well as a pronounced lack of motor coordination and an elevation of MAO-A activity in the sensorimotor cortex and in the caudate nucleus to 200-365% above baseline activity. No significant changes were observed in the activities of AChE. On the 2nd day after TPA administration, behavioral changes normalized; while on the 3rd day, further

deterioration was evident. In addition, the 3rd day was also marked by some elevation of MAO-B activity in the sensorimotor cortex and depression in the caudate nucleus, while MAO-A remained elevated in both formations. Both formations also showed limited elevation of AChE activity. Additional data pointed to intensification of protein synthesis and enhancement of aminopeptidase activity in the caudate nucleus. The profound electrophysiological, biochemical, and behavioral changes induced by TPA are factors that should be carefully considered in formulating human trials with analogous substances. Figures 5; references 18: 11 Russian, 7 Western.

UDC 612.822.5+612.822.6+612.8.015

Early Behavioral, Morphological, and Biochemical Correlates of Neural Transplants in Brain-Damaged Mature Rats

18400333b Moscow ZHURNAL VYSSHEY NERVNOY DEYATELNOSTI IMENI I. P. PAVLOV in Russian Vol 38 No 5, Sep-Oct 88 (manuscript received 6 May 87) pp 922-930

[Article by I. V. Yermakova, Ye. V. Loseva, and N. V. Gulyayeva, Institute of Higher Nervous Activity and Neurophysiology, USSR Academy of Sciences, Moscow]

[Abstract] An analysis was conducted on the physiological sequelae of fetal neural implants in homotopic cerebral sites in mature rat recipients. Fetal amygdaloid homogenates (0.5-0.8 mm) derived from the 20th to 22nd day of gestation were implanted into left amygdala of male recipients, with the latter monitored for 40 days after transplantation. The behavioral data showed that food-searching behavior deteriorated in the control animals for some 2 weeks after sham injury to the amygdala; whereas in the experimental rats with the implant, an essentially normal behavior pattern was recovered within 6 days. Histological and histochemical studies on the appropriate brain sections revealed that the presence of the fetal neural tissue mitigated undue glial proliferation and facilitated healing and regeneration. After 2 weeks, essentially normal brain chemistry and histology prevailed in the recipients, with the results attributed to the influence of the fetal tissue on reparative and adaptive potential of the adult brain. Figures 5; references 24: 14 Russian, 10 Western.

UDC 616.89-008.441.13-092.9-092:[616.831-008.94:577.175.823

Effects of Active Immunization with Serotonin-Protein Conjugate on Alcohol Intake in Rats and Levels of Biogenic Amines in Brain and Body Fluids

18400334a Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 88 (manuscript received 17 Sep 87) pp 25-29

[Article by N. V. Bobkova, L. A. Plakhinas, L. A. Basharova, L. A. Vetrile, Ye. A. Gromova, and V. A.

Yevseyev, Laboratory of Neurotransmitter Systems, Institute of Biological Physics, USSR Academy of Sciences, Pushchino; Laboratory of Pathophysiology of the Immune System; Scientific Research Institute of Pathology and Pathologic Physiology, USSR Academy of Medical Sciences, Moscow]

[Abstract] Experimental therapeutic trials were conducted on rats to assess the effects of immunization with serotonin-BSA conjugates on alcohol uptake and levels of biogenic amines in the brain and body fluids. The study was performed with male Wistar rats, divided into a control group and an experimental group that was given only 20% ethanol to drink for 8 months in lieu of water. The immunization schedule was as follows: 1-2 mg/kg conjugate s.c. in complete Freund's adjuvant, followed in 2 weeks by 5 mg/kg i.p. without adjuvant, plus three weekly i.p. immunizations with 10, 10, and 15 mg/kg without adjuvant. Passive hemagglutination studies showed peak antiserotonin titers after the 2nd immunization; at all times the antibody response in the "alcoholic" rats was less pronounced than in the control animals. Alcohol uptake by the experimental rats fell by 19% as a result of immunization, while water intake increased 1.5-fold under free-choice conditions. However, immunization did not lead to any other discernible behavioral changes. In the immunized animals' blood and urine, levels of serotonin fell to 44.2 and 49%, respectively, with control values taken as 100%. The latter changes were attributed to immune elimination. The data also showed that, as a result of immunization, the elevated serotonin levels in the hippocampus of the experimental rats were depressed to below the control levels seen in immunized control animals (1099 and 1560 ng/gm, respectively). In the unimmunized control rats and the experimental rats, the hippocampal levels of serotonin were, respectively, 1625 and 1920 ng/gm. Active immunization with serotonin was thus shown to be effective in limiting alcohol intake by Wistar rats, while the determinations of biogenic amines in the brain provided indications of hippocampal involvement in the pathogenetic process. Figures 2; references 20: 13 Russian, 7 Western.

UDC 612.822.1:547.95:547.943].06:613.863

Effects of Hypogravity-Induced Chronic Stress on Enkephalin- and Angiotensin II-Forming Peptidases of the Brain and Peripheral Tissue

18400334b Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 88 (manuscript received 7 Jan 88) pp 52-57

[Article by O. A. Gomazkov, A. P. Rostovtsev, N. V. Komissarova, A. D. Panfilov, I. A. Yelistratova, and V. V. Fomin, Scientific Research Institute of Medical Enzymology, USSR Academy of Medical Sciences, Moscow]

[Abstract] The effects of a 2g force on enkephalin and angiotensin II metabolism were studied in male Wistar

rats weighing 357 plus or minus 9.4 g and subjected to virtually round-the-clock centrifugation for 5 days. Activities of the angiotensin-converting enzyme (EC 3.4.15.1) and enkephalin-forming carboxypeptidase (EC 3.4.17.10) in the various brain formations and other organs were analyzed in relation to the duration of centrifugation. After 1 day of 2g stress, the carboxypeptidase activities in the striatum, thalamohypothalamic region, and the pituitary decreased by 25, 13, and 28%, respectively. However, over days 3-5, the activities again rose to baseline values. In the adrenal glands, the activity of the carboxypeptidase rose by 35%. Changes observed in the converting enzyme followed a different pattern: after a small decrease in activity after 1 day at 2g, subsequent changes consisted of a gradual rise. After 5 days, the increase in the activities of the converting enzyme was 49% in the kidneys, 37% in the adrenal glands, and 210% in the striatum. In the midbrain, however, the activity of the converting enzyme diminished to 9% of the baseline. These changes in the metabolic patterns of enkephalin and angiotensin were interpreted as representing adaptive changes designed to compensate for the stress of hypergravity. Figures 2; references 28: 9 Russian, 19 Western.

UDC 612.63/.64.014.46:[615.357:577.175.82]

Effects of Substance P on Pregnancy and Fetal Status in Albino Rats

18400334c Moscow PATOLOGICHESKAYA FIZIOLOGIYA I EKSPERIMENTALNAYA TERAPIYA in Russian No 5, Sep-Oct 88 (manuscript received 18 Apr 87) pp 72-75

[Article by A. M. Pustynnikova, L. A. Denisova, Ye. Vakhtel (E. Wachtel), K. Gekht (K. Geht), and P. Oeme, Institute of Biomedical Problems, USSR Ministry of Health, Moscow; Charite Clinic, A. Humboldt University, Berlin, GDR; Institute of Biologically Active Substances, GDR Academy of Sciences, Berlin]

[Abstract] Three-month-old female Wistar rats were used to assess the effects of exogenous substance P (SP) on the course of pregnancy and on the fetus. SP was administered intraperitoneally (125 mg/kg) on the 10th, 13th, and 18th day of gestation. Assessment of the effects on the females on the 21st day of pregnancy showed that the most pronounced changes consisted of an increase in the weight of the adrenal glands by 26% in rats treated with SP on the 18th day, and an increase in the weight of the liver in rats treated on the 13th day. Changes in the weight of the thymus were more complicated. In the rats injected on the 18th day of gestation, there were no changes in the weight of the thymus vis-a-vis control values; but rats treated on the 13th day could be divided into one set with a thymic weight of 193 plus or minus 10 mg and another group with 420 plus or minus 35 mg. The average thymic weights for the experimental rats treated on the 13th day and for control groups did not differ significantly. Analogous results for thymic weight were obtained for the rats treated with SP on the 10th

day. The average values for the control and the experimental groups did not differ to a statistically significant extent, but the latter group consisted of subsets of animals with widely disparate thymic weights (316 plus or minus 15 mg and 186 plus or minus 13 mg). Fetal effects consisted of an increase in the placental weight in SP-treated animals (0.54 g in control animals, 0.71-0.74 g in experimental animals), as well as in fetal weight (control = 3.83 g; experimental = 4.12-4.38 g). In addition, the fetal mortality was 9-13% in the experimental group and 4% in the control group, while the incidence of placental pathology was 10.2-13.2% and 1.2%, respectively. On balance, these observations point to a telling effect of SP on pregnancy and fetal status in Wistar rats. Figures 1; references 11: 1 Polish, 1 German, 8 Russian, 1 Western.

UDC 612.53+612.118.2

Effects of Triiodothyronine and Catecholamines on Long-Term Cold Adaptation in Rats

18402001 Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I. M. SECHENOV in Russian Vol 75, No 1, Jan 89 pp 110-116

[Article by V. I. Sobolev and V. A. Anokhin, Chair of Human and Animal Physiology, Donetsk State University]

[Abstract] The effects of certain endocrine mechanisms in the maintenance of long-term cold adaptation were investigated in outbred male rats subjected to cold adaptation at 5°C for 25 days. Comparison of cold-adapted animals and control rats showed that the latter displayed marked hypertrophy of the thyroid gland, heart, right adrenal gland, liver, and interscapular brown fat. In addition, the drop in body temperature in the adapted animals at -25°C was reduced to an average rate of 0.2°C per hour, versus a rate of 4.8°C per hour for control animals. Deadaptation of the rats at +30°C for 15 days completely reversed the physiological changes induced by cold adaption. However, treatment of the rats with either triiodothyronine or with norepinephrine during the deadaptation phase precluded rapid deadadaptation, with the combination of triiodothyronine and norepinephrine shown to be most effective. In the latter case, body temperature reduction was limited to a rate of 0.8°C. Treatment of the rats with propranolol in combination with reserpine accelerated the process of deadadaptation. These findings demonstrated that regulation of long-term cold adaptation may be achieved by proper manipulation of the endocrine status of the experimental animals. References 8 (Russian).

UDC 12.014.766.1(035)

Efficiency in Mountainous Antarctic in Individuals With Varying Levels of Hypoxic Instability

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[Article by A. L. Maksimov, Institute of High-Altitude Physiology and Experimental Pathology, KiSSR Academy of Sciences, Frunze]

[Abstract] A comparative evaluation was conducted on the physical performance of subjects exhibiting high and low hypoxic tolerance, in order to assess their suitability for assignment to the Antarctic Vostok station located 3488 m above sea level. The experimental part consisted of stress testing on an exercise cycle with a 150 W load for 6 min, with performance efficiency calculated according to the following formula: $150 \times (170 - HR_1) / (HR_6 - HR_1)$, where HR_1 is the heart rate after the first minute of exercise and HR_6 , the heart rate after 6 min. Comparison of the baseline values obtained in Leningrad and the data obtained after 3-45 days at the Vostok station during expeditions No. 26 and 27 revealed that physical performance decreased 1.5- to 2-fold within the first week in the Antarctic at the elevated altitude. Over the subsequent two to three months, performance improved and reached a plateau that was, however, below baseline (i.e., Leningrad) performance. During the Polar night, performance fell by 10-12%, again rising toward the end of the Polar winter. In general, these observations demonstrated that physical performance deteriorated under the conditions prevalent in the central part of Antarctica. Since subjects with low hypoxic tolerance showed a much greater reduction in physical performance, the test was judged to be 80-90% accurate for predicting individual suitability for assignment to the Vostok station. References 20: 17 Russian, 3 Western.

UDC 612.532;612.821.3

Effect of High Temperatures on Certain Indices of Physiological Status and Efficiency

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[Article by I. M. Mommadov, I. P. Bondarev, M. N. Isayeva, O. I. Litvinenko and O. I. Vylegzhannin, All-Union Scientific Research Institute of Work Safety, Sverdlovsk]

[Abstract] A study was conducted on the effects of high temperatures on the psychophysiological status of 50 male electricians, 26-35 years old, in order to assess the effects of such environmental factors on lability of the nervous system and work performance. The parameters under evaluation included determination of the flicker fusion frequency, differential visual-motor responses, motor coordination, attention-span tests, and body temperature regulation. The comparative data were obtained in May (mean air temperature +18°C) and July (+35°C). The tabulated data demonstrated that the high summer temperatures had a deleterious effect on the results of the flicker fusion test and differential responsiveness. Interestingly, however, work performance indicators—e.g., motor coordination and attentiveness—were relatively unaffected. These observations were interpreted to indicate that despite the fact that the neural adaptive mechanisms were stressed, actual work performance of highly skilled electricians did not suffer significantly. Figures 1; references 4 (Russian).

Measures to Improve Ecological Situation in Chernovtsy

18400265 Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28 Dec 88 p 4

[Article by Yu. Kornev: "Three Months After"; first paragraph is introduction in source]

[Text] It is said that a great tragedy overshadows a small one. The tragedy in Armenia overshadowed many events which disturbed readers quite recently. One such event is the accident which occurred in Chernovtsy. Although the scope of suffering from the two events cannot be compared, the fate of children, judging by letters to the editor, didn't leave people indifferent. What is the situation in the city at present?

Mothers and grandmothers walk along the streets with the little ones; children hurry to school in the morning. Life is returning to normal.

We shall recount briefly what occurred. In September, alarmed parents began to consult physicians—their children's hair was falling out. Small children in the 1-4 year age range suffered more than others. Analyzing more than 20 possible causes ranging from a disease of a viral nature to the effect of automobile exhaust gases, a group of experts came to the sad conclusion that the children had been exposed to the heavy metal thallium.

The source of the thallium, which was found in amounts dangerous to health, still has not been determined precisely. It is assumed that there was a single undetected discharge into the air and water. It is a pity that the culprits were not found. Of course, this is not easy to do if there is no well-equipped, constantly operating system for monitoring the state of the natural environment.

Deputy USSR Minister of Health A. Baranov recently reported at a press conference in Chernovtsy: "Judging by everything we know, the injurious factor is now completely inactive or it is no longer a hazard because of resolute measures which were taken."

Have all necessary measures been taken to make certain that a similar situation does not occur? The chairman of the Chernovtsy Oblast Ispolkom (oblast executive committee), V. Lenchinskiy, answered this question: "Wide-ranging operations were conducted to sanitize the city. Some 15,000-20,000 persons worked on sanitation measures daily. All enterprises, parks, areas, squares, and reservoir banks were sanitized, without exception. Even the sand in the filters in the water supply system was replaced, and activated charcoal and other components were added."

On average, these measures reduced by a factor of 3-6 the thallium level in the places in the soil which previously contained a high concentration. Scientists consider these levels to be within limits of the natural biochemical background level. About 15 enterprises and shops that were degrading the biological situation in the city have been closed completely. Private and commercial motor

transport has been greatly curtailed. School and boarding school students have received free meals that are based on specially developed recommendations of the USSR Academy of Medical Sciences Institute of Nutrition and the UkrSSR Ministry of Health Institute of Nutritional Hygiene.

Now that the danger point is behind us, the events in Chernovtsy require more careful scrutiny.

"We were not ready for it," said professor I. Trakhtenberg, a laboratory director at the Kiev Scientific Research Institute of Labor Hygiene and Occupational Diseases, "and not just because the city had no equipment or methods for quantitative analysis of heavy metals or other chemical pollutants in the environment. With each passing year, the press of modern technologies will weigh more and more heavily on nature and man. I am convinced that it is time to create, in the Soviet Union, a service which can react quickly to emergency ecological situations. Probably, this service should include experts in different specialties, such as chemists, toxicologists and psychologists. There should be an All-Union data bank containing information on all present-day chemical and biological pollutants."

Moreover, the absence of current, reliable information engendered, at first, a wave of conjecture and rumors. There were meetings in the city whose tone was set by the already agitated mothers and by townsfolk who were worried about the health of the children. It would seem that there is no need to mention this now that the city has calmed down. However, a sociological survey of the populace conducted this past November by staff members of Chernovtsy University showed that about 90 percent of the inhabitants have a low opinion of the official information about the situation in the city.

Many different kinds of specialists and directors of union and republic ministries have visited Chernovtsy in the last 3 months. Many sensible suggestions have been offered, and many encouraging promises have been made. It is hoped that this unusual situation will prove to be a serious lesson for more than just the local directors.

UDC 614.2:008(47+57)

Results of Sociological Study of Problems in Development of Soviet Health Care

18400371a Moscow VESTNIK AKADEMII MEDITSINSKIKH NAUK SSSR in Russian No 12, Dec 88 (manuscript received 15 Mar 88) pp 23-29

[Article by A. A. Kiselev, T. A. Siburina, V. V. Vyugin, V. N. Ishchenko, N. I. Vakhromeyeva, and S. A. Leonov, All-Union Scientific Research Institute of Medical and Medicotechnical Information USSR Ministry of Health, Moscow, under the rubric "Scientific Surveys and Reports"]

[Text] Within the framework of a national discussion of the draft of the CPSU Central Committee and USSR Council of Ministers of the "Basic Guidelines of the Development of the Protection of Public Health and the Restructuring of USSR Health Care in the 12th Five-Year Plan and for the Period up to the Year 2000," a sociological study was conducted in September 1987 by the All-Union Scientific Research Institute of Medical and Medicotechnical Information, USSR Ministry of Health, with the broad involvement of territorial agencies for public health management, to investigate public opinion about the status of health care and steps to improve it. The results of this study were supplemented with data from the national discussion of this draft, obtained on the basis of analysis of letters workers sent to party and soviet organizations, mass media and the USSR Ministry of Health. The purpose of this study was to pursue a deeper, more specific investigation of several issues of paramount importance touched upon in the draft and in the letters of the workers; determination was made of the extent of support by broad segments of the public for the state's policy on health care and disease prevention. We determined what were, from the standpoint of various population groups, the priority directions of such work. An evaluation was made of the extent to which the public is satisfied with the state of medical care and the principal means of improving it; a study was made of the public's attitude toward expanding fee-based services in health care, of the most desirable forms of rendering them from the consumer's point of view, and of other issues related to the organization of medical care.

In addition, our purpose included assessing the public's interest in matters of restructuring of health care, the public's involvement in the national discussion of the draft, and the confidence in the implementation of planned measures, as well as obtaining specific suggestions on how to improve the different sections of this document.

The public opinion sample consisted of 3,100 people representing different age-sex, occupational, social and other groups of our country's population. The sample was formed in specially selected regions. The aggregate of sampling screening units was represented by 71 RSFSR oblasts, 25 Ukrainian oblasts, 6 Belorussian oblasts, 17 Kazakhstan oblasts, and 11 union republics and comprised 130 territorial entities. The inhabitants of the selected regions constitute 13.2 percent of the nation's population, including 15.8 percent of the urban population and 8.3 percent of the rural population.

The number of people questioned in each area was determined by the population size of that area, while the composition of the sample was based on systematic random selection. Deputies—staff members of the USSR Ministry of Health's All-Union Scientific Research Institute of Medical and Medicotechnical Information—were sent to all the research bases to organize the research, form lists of interviewees and train the individuals conducting the poll. Data were

gathered on the basis of questionnaires, which involved visiting the interviewee at home and recording the answers to the questions in his presence. That made it possible to achieve a high quality in the filling out of the questionnaires and an extremely high rate of return of the questionnaires.

Statistical processing of the data involved analysis of incidence and magnitude of an attribute, the construction of analytical tables and the calculation of the coefficient of contingency and correlation.

The draft of the CPSU Central Committee and USSR Council of Ministers on the means of restructuring health care prompted considerable interest among broad segments of the public. More than 87 percent of the public were familiar with its basic theses; every fourth interviewee stated that he had read the entire draft, and 32 percent had read some of its sections. The extent of the interest that the various groups displayed in the document in question depends largely on social status and occupation. For example, 28.4-47.1 percent of individuals who belonged to different groups of professional people (engineering and technical personnel, white-collar workers, intellectuals not working in industry) had read the entire draft; whereas only 15.8 and 14.1 percent of blue collar and farm workers, respectively, had done so.

There was a strong correlation between interest in the draft and level of education. Individuals with higher education had read the draft in 46.2 percent of the cases, while those with secondary education did so in considerably fewer cases (14.9 percent for those with general education and 27.6 percent with specialized education).

Middle-aged people (40-59 years of age) paid more attention to the document than did other age groups (30 and under and 60 and over). We noticed that the state of health of the interviewees, the frequency with which they sought medical care, and the degree of satisfaction with the quality and organization of medical care had no appreciable influence on public interest in health care problems.

More than 20 percent of the interviewees had participated in group discussion of the draft at enterprises, organizations and institutions. According to our data, about one percent of those questioned forwarded their suggestions and comments to the mass media, party and soviet organizations, as well as public organizations.

Of those who had read the document in its entirety, 41 percent had participated in the discussion, versus 21 percent of those who had read parts of it. In 82 percent of the cases, individuals who had not read the draft followed its discussion in the press, on radio and on television.

Involvement of the public in the campaign to discuss this draft was largely determined by their attitude toward the content of the measures outlined and their confidence in the implementation of the measures.

The belief that this document is important to the matter of the restructuring of health care was analyzed on the level of the individual interviewee's interest, and it was determined by analyzing the answers to the question, "In your opinion, will implementation of the items in the plan improve medical care for you and your family?" A lack of confidence as to the efficacy of the measures outlined was expressed by only 6 percent of those questioned, and about 27 percent abstained. The rest voiced varying degrees of confidence (46 percent were completely confident, and 19 percent were somewhat confident). The more people knew about the contents of the document, the greater their confidence in efficacy of its implementation. Individuals who had read the draft in full expressed confidence in its efficacy in 80 percent of the cases; there was also the lowest percentage of abstentions among them—15 percent of those questioned.

First among the factors affecting the public's confidence in the implementation of the steps outlined in the draft was degree of satisfaction with the existing level of medical services. Thus, among interviewees who gave a positive rating to the current state of medical care, 69 percent expressed confidence in the expected impact, versus only 53 percent of those who were dissatisfied with medical services.

The first section of the draft, which states that prevention is the general line of Soviet health care, had the broad support of the public. All interviewees indicated that there was a need for implementation of state steps to safeguard public health.

Assessment of the social relevance of the outlined measures and determination of what should be, from the standpoint of various groups of the public, the priority directions were effected on the basis of analysis of answers to the question: "What measures do you think must be implemented in order to improve your health and that of your family?"

More than half of all those polled mentioned to need to improve the sanitary and hygienic condition of densely inhabited areas (central water supply, prompt removal of garbage, etc.). The desirability of intensifying monitoring of environmental pollution was mentioned by 42.8 percent of the interviewees.

Third in importance was greater accessibility of sanatorium and resort care (41 percent). A total of 38.8 percent mentioned the need to improve working conditions, and 30.7 percent mentioned construction of athletic and health-improving complexes and making them more accessible to the broad masses.

Steps to activate a campaign against bad habits were supported by 27.9 percent of those polled. The need to improve early detection of disease and raise the quality of outpatient care was noted by 24.3 percent of the public, expansion of preventive work with families (establishment of the position of family physician) by 19.7 percent, and improvement of health education work by 11.1 percent.

Table 1 lists the priority ranking of preventive measures for different population groups.

Table 1. Support by different population groups of principal measures aimed at improving health care (average number of responses per 100 polled in each group)

Measure	Urban population	Rural population	Blue-collar and farm workers	Professionals (engineering and technical personnel, white-collar workers, individuals not employed in industry)	Retirees	Individuals 30 years old or under
Improvement of working conditions	34.3	46.7	49.4	36.1	24.6	44.3
Construction of athletic and health-improving complexes, increasing their accessibility to the broad masses	33.1	26.4	32.0	33.0	20.9	39.5
Intensification of monitoring of environmental pollution	46.6	36.4	40.7	43.3	45.2	41.9
Improvement of sanitation in cities, villages, rayons (centralized water supply, sewer system, etc.)	50.7	55.3	51.5	49.4	58.4	53.1

**Table 1. Support by different population groups of principal measures aimed at improving health care
(average number of responses per 100 polled in each group)**

Measure	Urban population	Rural population	Blue-collar and farm workers	Professionals (engineering and technical personnel, white-collar workers, individuals not employed in industry)	Retirees	Individuals 30 years old or under
Improvement of early detection of disease and quality of outpatient care	21.4	21.2	18.0	23.6	23.7	16.0
Disease prevention in the family	20.4	18.5	15.1	21.5	24.6	16.1
Greater accessibility of sanatorium and resort care	42.5	38.3	37.5	45.1	39.1	34.7
Active campaign against bad habits (alcoholism, smoking, etc.)	25.4	32.3	27.7	27.0	31.8	27.0
Improvement of health education work with the public	9.5	13.9	12.8	8.2	13.4	12.1

We noticed that questions of sanitation in populated areas are the most important to all population groups. In order to improve health care of the rural population and young people, primary attention should be given to improvement of their working conditions. Solution of the problem of environmental pollution is a top priority in cities, rather than in rural areas. On the other hand, the need to start a campaign against bad habits is more significant among the rural population.

Urban residents and particularly individuals engaged in mental work are the most acutely aware of the shortcomings in the provision of sanatorium and resort treatment.

Analysis of the responses of the urban population residing in different types of cities (major administrative-industrial and oblast centers, cities under oblast jurisdiction and rayon centers) revealed that for major cities it is the most important to solve problems of environmental protection (indicated by 47 percent of those polled); whereas for all the rest it was improvement of sanitation, as indicated by 48 to 55 percent of those questioned.

The draft devotes much attention to a description of a long-term program for improving the quality of medical care.

Considering the social importance of the developed proposals and the high degree of interest of all segments of the population in their effective implementation and assuming specific individual experience in the form of personal contact between interviewees and the health care system, we tried to analyze the ranking of means of

improving the system of medical care with due consideration of the initial level of satisfaction with the work of the health care system. A positive rating of medical care was made by 31 percent of those questioned, and a satisfactory rating by 53 percent. About 6 percent rated medical care as unsatisfactory and 10 percent abstained from answering.

As shown by our analysis, satisfaction with medical services depends primarily on how often one seeks medical care. Unfortunately, the more often an interviewee sought medical care, the lower the rating he gave of its quality. The highest rating was given by individuals who did not visit health care institutions and based their assessment on the collective opinion of people around them. However, one should take into consideration the fact that such ratings are very susceptible to the influence of subjective perception. The demands made of health care by individuals with higher education are considerably greater than those of groups with a secondary education or lower. Interestingly enough, blue-collar and farm workers were entirely satisfied with medical services in 36 percent of the cases. However, different strata of the intelligentsia (industrial, white-collar, creative workers) were satisfied in 18-20 percent of the cases. Analysis of dissatisfaction revealed that it was attributable to poor organization of work at medical institutions in 36.9 percent of the cases; to poor sanitary and hygienic conditions of treatment-and-prevention institutions and poor quality of services in 27.2 percent of the cases; and to a low, in the opinion of interviewees, efficacy of treatment and outpatient care in 23.1 percent

of the cases. In only 9.2 percent of the cases was infraction of deontological guidelines for medical care mentioned.

According to the results of our study, most of the public received medical care in the health care institutions assigned to their place of residence. Primary medical care was rendered in health care institutions assigned to

the workplace in 17.2 percent of the cases for the urban population and 4.6 percent for rural residents.

A study of the assessment of different aspects of organization of medical care was conducted among different population groups in relation to where they received their primary medical care by means of identifying the problems that an interviewee (or member of his family) encountered in receiving medical attention within the last year (Table 2).

Table 2. Shortcomings in medical services to the public as a function of place of residence and place of primary medical care (per 100 interviewees in indicated groups)

Type of shortcoming	Urban population		
	Institution in area of residence	Institution at workplace	rural population
No shortcomings	43.7	39.1	50.3
Absence of necessary physicians at polyclinic	17.7	21.2	15.9
Poor quality of treatment	9.3	12.5	4.8
Great time expense visiting polyclinic (receiving referral slips, waiting to be seen, etc.)	35.4	35.5	20.5
Difficulty in obtaining a diagnostic work-up	14.1	14.3	15.9
Inconsiderate attitude of physician, rudeness, and callous medical personnel	8.2	10.7	3.7
Impossible to receive care in the evenings or on holidays	5.1	6.1	5.6
Poor hospital care	8.1	6.4	3.5
Unsatisfactory sanitary and hygienic conditions in hospitals, maternity homes and other institutions	9.9	10.0	6.6
Impossible to obtain needed drugs and medical supplies	30.5	34.5	28.0
Going through the motions of mass health screening	9.5	15.1	5.6
Refusal to hospitalize or to make consultation referral to other health care institutions	4.5	3.6	2.3
Cases of abuse of occupational position of personnel	0.9	1.3	0.6

Analysis of the data in Table 2 shows that all of the polled population groups consider the greatest problems in receiving medical care to be poor organization of polyclinic visits and unsatisfactory supply of drugs and medical supplies. Apart from these shortcomings, the public is most often faced with a lack of necessary specialists and difficulty in getting a diagnostic examination. The data in Table 2 indicate that the problems of rendering medical care at health care institutions are the same, regardless of location of the medical services (territorial or industrial).

As shown by the answers to the questionnaire, the public relates the possibility of improving medical care primarily to implementation of the following measures: enhancement of material incentives for medical personnel (50 percent of those surveyed), construction of new health care institutions and modernization of existing ones (48%); efficient organization of work of medical personnel (35%); advanced training of medical personnel (33%); organization of good care in the home (32%); improvement of hospital conditions (28%); increase in number of sanatoriums and resorts, children's school and preschool institutions of the sanatorium type (23%).

We noticed that residents of rural areas mentioned the need for improvement of the material and technical base of health care institutions considerably more often (60%) than did the urban population (40%).

The state of territorial health care had an appreciable influence on choice of the main directions for improving medical care.

Thus, individuals who gave an unsatisfactory rating to medical care feel that the highest priorities in the improvement of medical services should be given to raising the level of professional training of medical personnel (50 percent of those surveyed), increasing the material incentives of medical workers (46%), and improving the organization of work at public health institutions (44%).

About 70 percent of the population believe that the diagnostic laboratory base of health care institutions needs to be strengthened in order to improve disease detection, while 30 percent stated that it would be desirable to establish major (republic, kray, oblast level) diagnostic centers. There was considerable stability of

this opinion, and it was unrelated to the sociodemographic composition of those polled, their place of residence (urban or rural), administrative type of city, state of health or frequency of visits to health care institutions.

Because of the wide discussion prompted by the item in the draft concerning expansion of fee-based services in health care, a study was made of the opinion of broad segments of the public on this issue, which is of interest to many people. It should be stated right away that almost 32 percent of the public consider it undesirable to introduce additional fee-based services. We noticed that the figure was much higher among farm workers—46 percent—as well as among people without a secondary education (primarily low-income groups)—40 percent. As for pensioners, more than 70 percent of them considered it desirable to expand fee-based services. This

position received considerable support among representatives of various groups of professionals: engineering and technical personnel (74%), white-collar workers (72%), as well as intellectuals not employed in industry (80%).

A study of the need for various types of fee-based services was pursued in relation to different population groups (Table 3). It is obvious from analysis of the data in Table 3 that, of all types of additional fee-based services, the public preferred organization of fee-based visits to highly skilled specialists in budget-carried health care institutions, expansion of the network of cost-accounting institutions, availability of fee-based patient care services, and the opening of boarding houses for chronic patients. The suggestion to offer the opportunity to pay extra for individualized patient meals at hospitals elicited the least approval.

Table 3. Need to expand different types of fee-based services in health care (per 100 interviewees in indicated groups)

Types of paid services	Urban residents	Rural residents	Blue-collar workers	Professionals	Retirees	Total population
Opening new fee-based polyclinics and offices for private treatment	34.4	32.3	33.3	35.2	28.9	33.6
Organization of additional fee-based visits to highly skilled specialists at polyclinics and medical units	42.6	37.9	40.3	44.3	35.1	40.8
Expansion of fee-based medical services for treatment and care of patients and the opening of additional types, including those for individual occupations	32.7	28.8	28.8	33.9	34.0	31.3
Establishment of fee-based boarding houses providing treatment, including those for temporary stays by chronic patients	32.6	23.9	26.9	31.9	32.3	29.4
Establishment of cost-accounting health centers affiliated with workplaces and place of residence for implementation of health-improving measures (physical training, sports, massage, conditioning, etc.)	25.8	21.0	24.8	30.1	11.6	24.1
Offering opportunity to patients and their relatives to pay extra for individualized meals at hospitals	15.4	17.4	15.2	15.8	18.4	16.1

Support by the public of the workers' initiative to establish a Soviet health fund was an indication of the great interest of the public in restructuring health care. Agreement to support through their own voluntary contributions to a health fund was expressed by 66 percent of the public; 11 percent disagreed and 23 percent abstained. Assessment of the existing state of medical services had the most appreciable effect on the public's motivation for participating in financial support of health care. Individuals who gave a positive rating to the state of health care in their territory (73 percent of those polled) were the most willing to support a health fund. Only 48 percent of those who were dissatisfied with local health care voiced their willingness to support the proposed fund.

Thus, we should call attention to the fact that the public is largely ready to offer material support of restructuring health care in areas where there is a more realistic expectation of a high return from invested resources.

Among the social aspects affecting the interests of a considerable segment of the public, there was discussion in the course of the poll of the question of changing the system of issuing monetary subsidies for temporary disability. The need to clarify public opinion on this matter arose because of the numerous proposals made by medical workers to revise payments made on the basis of sick-leave certificates in order to relieve the overload of medical personnel during polyclinic visits and the allegedly high disability figures for employed pensioners.

The public opinion poll revealed that the public essentially supports the existing system of medical certificate payments (83 percent of those polled). More than 13 percent consider it desirable to augment the subsidies for individuals with short work tenure, particularly those working under adverse conditions, as well as to lengthen the terms for which sick-leave certificates are issued for taking care of family members, including sick children. Only 5 percent of those polled deemed it possible to lower sick-leave payments for different population categories: for those who do not take care of their health (alcohol abusers, smokers, etc.), as well as employed pensioners.

The following suggestions were offered for definitive refinement of the draft: clearer definition of the priority directions to be taken in the development of health care under each five-year plan (29 percent of those questioned), more thorough assessment of feasibility of implementing the strategic tasks set forth before the year 2000 (42 percent), greater specificity of tasks for different ministries and agencies (29 percent).

Our analysis revealed that the sociological study generally achieved its goal; it helped identify the opinion of broad segments of the nation's population concerning future directions in the development of health care, consideration of which would bring the outlined measures considerably closer to the needs of the principal consumers of the health care system and would have a beneficial effect on the efficacy of implementation of the tasks set forth.

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Current Problems of Infant Mortality

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[Article by M. Ya. Studenikin, Institute of Pediatrics, USSR Academy of Medical Sciences, Moscow]

[Text] The infant mortality rate is a most important integrated demographic indicator. It is determined by a wide range of biological, economic, cultural, sociohygienic and medical organizational factors. For this reason, upon the most comprehensive analysis it is difficult to single out the specific influence each of them has on infant mortality.

It is also known that there are several other demographic factors that are closely related to and dependent on infant mortality indicators: population mortality, average life expectancy, population growth, early disability and others.

In recent decades, decline of infant mortality rates or stabilization of low infant mortality rates has been the common trend in developed countries.

Without a doubt, a substantial influence on infant mortality has been exerted by state and social measures implemented in our country to improve the welfare of the people; to improve education and raise the level of culture; to improve housing conditions, diet, and the organization of labor and recreation; to protect the environment and preserve nature; and to improve the services for protecting the health of mother and child. For example, in the first 50 years of Soviet power there has been a more than 10-fold decline in infant mortality.

In the early 1970's, the indicator of infant mortality in the USSR became stabilized.

Some authors have tried to analyze infant mortality apart from other demographic indicators.

By attributing infant mortality rates solely to flaws in the performance of health care institutions, they are manifesting a tendentious approach to the problem.

At the same time, we cannot help but be alarmed by the fact that the USSR is in 50th place in infant mortality rate among all countries of the world, and that the overall USSR infant mortality rate has actually not declined in the last 15 years.

In those years, infant mortality dropped to almost one-half in a number of economically developed countries (from 20.0 to 10.9 per thousand in the United States, from 13.22 to 6.6 per thousand in Japan and from 18.5 to 10.7 per thousand in GDR).

Differences in mortality rates of different republics and between urban and rural areas are inherent in our country. For example, the infant mortality rate is low in Ukrainian SSR, Belorussian SSR, republics of the Soviet Baltic region and several oblasts of RSFSR. However, it is 1.5-2 times higher than in France (9.7 per thousand), Sweden (6.9 per thousand) and Japan (6.6 per thousand).

The comprehensive studies pursued at the USSR Academy of Sciences Institute of Pediatrics of causes and factors of infant mortality in 10 Union republics and 4 rayons of Moscow revealed that there are differences in structure of causes of infant mortality both in different parts of the country and in comparison with other countries.

In developed countries, the death of infants at 1 month of age constitutes 60-70 percent of child mortality. In the USSR, the death of children over one month old predominates in the age structure of infant mortality. The neonatal component constitutes 20.9 percent in Azerbaijan SSR, 36.6 percent in Kirghiz SSR, and 43.7 percent in Ukrainian SSR and Lithuanian SSR. These figures in our country are more promising for the actual decline of infant mortality.

In republics with low infant mortality rate, the structure of causes of infant mortality consists of perinatal pathology, abnormal development, and respiratory disease. In regions with a high level of infant mortality, diseases of respiratory organs are in first place among the causes, intestinal infections and sepsis are in second place, and perinatal pathology is in third place.

The figures for neonatal mortality are always higher in cities than in rural areas. There is also a dissimilar structure of causes of neonatal mortality. In areas where the rate is high, intrauterine hypoxia and asphyxia during labor are in first place, followed by birth trauma, respiratory disorder syndrome, diseases of respiratory organs and intrauterine infections. Where the infant mortality rate is low, the causes are respiratory disorder syndrome, infections specific to the perinatal period, and developmental abnormalities.

Our studies revealed a number of common and regional infant mortality risk factors. They can be divided into biomedical, sociohygienic and medical-organizational ones. In regions with a high infant mortality rate, sociohygienic and medical-organizational factors had the predominant effect on outcome of disease; whereas in regions with low mortality rate, biomedical factors were predominant. This already shows the true determination of infant mortality.

The following are among the biomedical risk factors of infant mortality: extragenital and infectious-inflammatory diseases in the mother, burdened obstetric history, and first childbirth in women 20 or under in whom, in a number of instances, illness had been detected only during pregnancy.

Premature birth, low birth weight, hypoxia, presence of diseases and background states are also biological risk factors referable to the fetus and neonate.

A set of factors that make up an improper life style is included in sociohygienic factors: low level of medical care on the part of the parents and lack of knowledge about health concerns (late visit to physician due to pregnancy or infant illness); lack of attention given to care, diet and rearing; bad spending habits in terms of family income; poor psychological climate in the home; and harmful habits.

Inadequate supply of food for children is a major problem in regions with high and moderate infant mortality rates. Only 30-35 percent of the dairy products needed are available, and the fat content of milk delivered to dairy kitchens is 2.5 percent instead of 3.2 percent. In rural areas there are no dairy kitchens or dry formulas that replace mother's milk. Nor are they always available in cities, and when they are available they are bought out by adults and do not reach infants 1 year old or younger.

The traditional customs in the home, large families, and short intervals between childbirths play a major role in republics of Central Asia, and this is indicative of the

complete absence of family planning. For example, in Bukhara Oblast of Uzbek SSR and in several rayons of Kirghizia every fourth urban woman and every third rural woman gives birth twice a year.

This group of factors also includes unsatisfactory supply of water to the public and poor quality of potable water.

In Kara-Kalpak ASSR availability of running water is 30 percent; in rural areas, it is 8 percent. Water is delivered in barrels, which increases the danger of a rise in intestinal infections. And this is not an isolated example. In a number of republics there is a poor water supply even for pediatric hospitals, and more than 50 percent of the infant institutions have no sewage system.

Shortcomings in the medical and preventive care of mothers and infants—which constitute the third, so-called medical-organizational group of infant mortality risk factors—have an adverse effect on the outcome of diseases in infants 1 year old or younger.

All areas showed, to varying degrees, poor quality of medical care for pregnant women in prenatal dispensaries, a lack of modern methods of examination and treatment, inappropriate tactics in management of labor, and the absence of resuscitation and intensive care of infants at birth. In the Ukrainian SSR, where the level of infant mortality is relatively low, about 50 percent of the neonates born with asphyxia are not examined at birth by neonatologists or anesthesiologists.

At the stages of infant care provided after discharge from maternity hospitals, we have found poor follow-up of neonates, lack of appropriate diet, inadequate examination and treatment of the sick, late diagnosis and diagnostic errors, and tardy hospitalization.

At the stage of hospital care of sick children, the following inadequacies were found: incomplete examination of a sick infant (due in a number of instances to the severity of its condition, the lack of diagnostic laboratory equipment, and lack of adequately qualified physicians), inadequate treatment as a result of the wrong diagnosis of disease, the absence of resuscitation and intensive care departments, and the lack of needed drugs at the hospital.

Inadequate physician qualifications is one of the causes of erroneous diagnosis and inadequate treatment of infants in regions with high infant mortality. According to the data of a survey study in Azerbaijan SSR, inadequate qualifications of medical personnel were the cause of improper examination in hospitals in 25 percent of the cases, of incorrect diagnosis in 36 percent, and of inadequate treatment in 5 percent.

Analysis of causes of infant mortality in the home and on the first day of hospitalization in a number of regions confirmed the existence of the above-mentioned factors.

It is not only in Union republics that inadequate medical care of infants at all stages was noted. Recently, our institute made a study of the quality of medical care of

infants in Oktyabrskiy Rayon of Moscow. The cross-section investigated revealed inadequacies in the medical care of 80 percent of the infants. They included the following: lack of examinations and observation by specialists, lack of monitoring of feeding, incomplete laboratory testing, failure to implement health-improving measures, unwarranted omission of inoculations, failure of parents to follow instructions, and lack of supervision of the parents; in 20-25 percent of the cases there was no observation of convalescing infants, inadequate drug therapy, and few active house calls.

According to the data of experts, 25 percent of the infants in this rayon were in a priority group and required outpatient care because of adverse social factors (chronic alcoholism of parents, large families, children born out of wedlock, repeated attempts by the mothers to give up a child, and others). Yet such infants were not on the dispensary rolls.

In more than 50 percent of the cases, pediatricians were to blame for inadequate treatment of sick infants; in 34 percent of the cases, it was due to incomplete examination; and in 7 percent, to parental tardiness in seeking medical care. Such a structure of causes of inadequate treatment was also demonstrated upon analysis of preventable deaths among infants 1 year old or younger in this rayon.

Analysis of causes of infant mortality revealed that there are reserves for lowering it. The reserves consist of the group of preventable deaths. We are referring to the infant deaths that could have been prevented by making use of modern scientific recommendations that are available when there is satisfactory performance by medical institutions and adequate social conditions and health education of parents.

Such reserves constitute from 59 to 70 percent in different republics, and those are real reserves.

At the present time, there are scientific developments and practical recommendations which could eliminate the influence of the main risk factors and controllable factors and lower significantly infant mortality if they were included in long-term comprehensive programs for lowering infant mortality at the level of every republic, oblast, city and rayon.

Under these conditions, a rise in the percentage of neonatal and particularly perinatal mortality is inevitable. At the present time, the mortality rate among neonates as a result of premature birth constitutes 45-60 percent of all neonatal mortality. And we see no tendency toward decline in premature births.

A study our institute conducted (T. Ya. Safonova et al.) of the causes and risk of premature birth in Estonian SSR, Kara-Kalpak ASSR and Kaluga Oblast revealed that the perinatal and neonatal mortality rate was higher for premature babies. For example, perinatal mortality

in Estonian SSR was 32.7 times higher than mortality among infants born at term, and neonatal mortality was 17.6 times higher.

Expert evaluation of quality of medical care of pregnant women and premature babies revealed that the probability of premature delivery is 8.1 times higher in women who had not been examined during pregnancy; asphyxia at birth was noted more than twice as often in infants born to such mothers, and intrauterine hypoxia three times more often.

A number of problems were also found in the care of premature babies (diagnostic errors, underestimation of severity of their condition, lack or inadequacy of resuscitation measures, improper use of drugs, tardy transfer to special departments, etc.).

Incompetence of physicians (30.4 percent), incompetence of pregnant women (28.3 percent) and incomplete examination (26.1 percent) were the causes of the above problems.

These data demonstrate a reserve in lowering neonatal mortality at its chief source, mortality among premature babies.

Infants with low weight are directly related to premature babies. They present an even more difficult problem. Pediatricians and obstetricians have not yet taken a specific stand with respect to this category of infants. The fact of the matter is that the survival rate among low-birth-weight babies, 1 percent of whom are premature babies, does not exceed 46 percent. Congenital abnormalities are noted among them three times more often. Of the surviving infants, 8-19 percent have gross neurological disturbances, while 80 percent have other disturbances that show up as learning problems when the children go to school.

Thus, infants with low weight have a significant effect on indicators of neonatal mortality and they are the source of the build-up of disability cases, not to mention the excessively great concerns associated with rearing such children.

Adoption of existing scientific developments included in the All-Union plan for introduction of the most important achievements of medicine into health care practice will help lower infant mortality in a number of regions of our country.

Thus, the adoption of new approaches in resuscitation and intensive care and in parenteral feeding of newborn and premature babies could lower infant mortality by 10-20 percent, depending on the region and provided that personnel are trained and there is adequate equipment.

Establishment of appropriate centers for resuscitation and intensive therapy and of departments for caring for

low-birth-weight infants could be of substantial importance in lowering neonate mortality. A 2 percent reduction in premature births would lower infant mortality by 9 percent.

Adoption of methods for prevention and treatment of dehydration in republics with a high infant mortality rate due to intestinal infections could reduce the number of deaths due to intestinal infections by 30-50 percent and the infant mortality rate by 10-15 percent.

Adoption of developments dealing with reducing the number of deaths due to pneumonia could lower infant mortality by 5-7 percent.

However, the existing system for introducing of scientific developments into practice is ineffective and does not provide for broad use of scientific advances at all stages of medical care. There is no clear-cut separation of duties and responsibility in scientific groups, health care management and clinical institutions in existing statutes and orders.

Since the results of research have not yet become broadly accessible to clinical health care and the level of medical care for children in clinical health care differs dramatically from scientific recommendations, scientific and technical program No 0.69.06 and the five-year plan call for solving a number of sociomedical problems and for further work with the problems of maternal, perinatal and infant mortality.

It is imperative for scientists of many institutes of the USSR Academy of Medical Sciences, the USSR Ministry of Health and the USSR Academy of Sciences to participate on a broader scale in developing all of the above directions. Only integrated research can assure scientific elaboration of steps for further reducing infant mortality.

Implementation of scientific developments and of the measures themselves to lower infant mortality depends on the following: (1) the quality and effectiveness of research and the forms and methods of introducing its results into practice; (2) the qualifications of physicians and medium-level medical personnel; and (3) the availability of equipment and drugs at research and clinical health care institutions in the context of growth of social well-being.

The means of lowering infant mortality are governed by the influence exerted on its causes and contributing factors (risk factors). The problem is to transform the causes within the shortest possible time into the category of preventable ones, and the risk factors into controllable ones. This will be possible only when infant mortality will be considered an interagency social problem.

Matters that involve the improvement of the quality of scientific developments and the effectiveness of their introduction, as well as those that involve raising the skills of medical workers and improving health care services, can and must be resolved by the USSR Ministry

of Health together with the USSR Academy of Medical Sciences. However, many other ministries, agencies and public organizations, along with soviet and party organs, must participate in solving problems of strengthening the material and technical base of public health and many social problems affecting infant mortality. Accordingly, it is time to establish union- and republic-level committees for problems of mother and child.

An integrated approach to the problems of combatting infant mortality in different republics and oblasts of our country has already produced a trend toward lowering or stabilizing infant mortality there.

The extension of such an approach, which has been started by the Scientific Council on Pediatrics of the USSR Academy of Medical Sciences, to Kirghiz SSR and Georgian SSR has confirmed the validity of this route.

Problems of infant mortality are complex and diverse, but they can be resolved under current conditions.

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UDC 614.88(470.311-25)

Specialized Emergency Medical Services in Moscow

18400289b Moscow SOVETSKAYA MEDITSINA in Russian No 10, Oct 88 (manuscript received 14 Dec 87) pp 70-73

[Article by V. G. Teryayev, A. V. Shmatov, L. L. Stazhadze, L. G. Kostomarova, and E. N. Chervochkin, Moscow Scientific Research Institute of Emergency Medicine imeni N. V. Sklifosovskiy; Emergency Medical Station]

[Abstract] A service profile and a time-and-efficiency analysis was conducted on the specialized emergency services in Moscow, which was designed to provide grounds for further improvement in this branch of health care. The data showed that the 131 specialized emergency teams were responsible for answering 13.6% of all the calls for medical assistance in 1986 in Moscow. The overall agreement between the request for specialized assistance and confirmatory diagnosis was 64.8%, ranging from a low of 36.1% for indications described as "heart trouble," to a high of 72% for confirmed cases of myocardial infarction. On balance, the data provided confirmation of the need for specialized emergency medical services to supplement general emergency care in critical situations that are beyond the scope of competence of the latter category of emergency services. In addition, the recommendation was made that a comprehensive therapeutic emergency service be established to meet the particular needs of disaster situations, the physicians of which would also bear the responsibility for overall coordination of medical relief efforts in major disasters. Finally, it is obvious that tailoring the specialized services to the needs of the populace on the basis of

statistical indicators should enhance both the quality and efficiency of emergency medicine in Moscow.

UDC 364.444:364.65-055.26

Protecting the Health of the Woman and Mother—A High-Priority Task of the Healthcare Sector of the Russian Federation

18402007a ZDRAVOOKHRANENIYE ROSSISKOY FEDERATSII in Russian No 3, 1989 pp 3-6

[Article by A. G. Gracheva, RSFSR deputy minister of health]

[Abstract] Maternal health and the medical care of all women in child-bearing years and of those approaching that age has acquired greater urgency in the RSFSR in view of the current awareness that this aspect of health delivery has been too long neglected. Accordingly, the ministries with a direct impact on this problem as well as other health authorities have issued binding regulations governing the health care given this contingent of the population and have assumed full responsibility for oversight and implementation. A pivotal factor in the success of maternal health care delivery is the active enforcement of the Zdorovye programs at the local level. Nevertheless, despite all of the measures that have been taken, the medical statistics to date have not improved and, in fact, continue to deteriorate. For example, the incidence of pregnancies with serious complications continues to rise as well as the figure for lost work days. While in 1985 there were 2.22 cases and 35.4 sick days per 100 women, by 1987 the respective figures were 2.39 and 38.2 days. Concomitantly, the number of abortions per 1000 women has increased from 115.7 in 1985 to 169.7 in 1987. In order to expand health care delivery to this segment of the population, greater efforts have been made to involve pediatric services and other clinical specialties in the problem at hand. In addition, health education programs have been reinforced and expanded, existing OB/GYN health services have been improved and, where indicated, new OB/GYN facilities have been established, and postgraduate training programs for the medical personnel have been reinvigorated.

UDC 616-084.3(470)

Primary Tasks of RSFSR Health Care Institutions in Effecting a Step-By-Step Transition to Mass Health Screening of the Population

18402007b Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 3, 1989 (manuscript received 5 May 88) pp 7-12

[Article by G. P. Skvirskaya, RSFSR Ministry of Health]

[Abstract] The success of the mass screening program in the RSFSR depends to a large extent on raising the level of consciousness and the sense of responsibility of those involved in the program, better administration of the

entire program, and enhanced efforts in terms of the health education of the populace at large. The key factors that are currently felt to have a telling impact and that are expected to play a more significant role in the future in mass screening are the formation of medical cooperatives, private medical practice on a fee-for-service basis, free choice of physician, and the right of physicians to grant up to ten days of sick leave on their own recognition. Unfortunately, it has become apparent that many health administrators have not adjusted to advances in medical care and have neglected the concept of mass screening. As a result, there appear to more than a thousand medical clinics and departments that have not undertaken mass screening, or have done so on a perfunctory basis. In addition, considerable regional variations exist in the approaches that have been taken to mass screening, making it hard to assess overall efficiency. However, it is anticipated that with greater computerization and introduction of new medical technologies, mass screening shall become an established fact of life in the RSFSR.

UDC 617-084.3:008

Means of Improving Mass Health Screening of Surgical Patients

18402007c Moscow ZDRAVOOKHRANENIYE ROSSIYSKOY FEDERATSII in Russian No 3, 1989 (manuscript received 5 May 88) pp 24-27

[Article by G. A. Bondarev, Kursk Oblast Health Department]

[Abstract] In order to assess the efficiency of the mass screening program with respect to surgical patients, an analysis was conducted on the clinical data obtained for the Kursk Oblast in the period 1984 through 1987. The evaluation demonstrated that the key factors determining the success rate in the case of the surgical patients were administrative efficiency, willing involvement of the surgical professionals, and systematic monitoring and followup procedures. Efficiency was largely predicated on the involvement of feldshers in making the primary diagnosis and referrals to surgeons for further workup, as well as the participation of surgeons in mobile medical teams serving outlying areas. The statistics demonstrated that surgical intervention was indicated in 289 patients out of every 1,000 that had been screened. In 12.3% of the cases the surgical problem was represented by varicose veins, while hernias accounted for 7.1% of the cases. The other major indications for surgery were represented by benign neoplasms (1.7%), proctological pathology (1.4%), urogenital disorders (0.9%), and breast diseases (0.5%). In short, it appears that approximately five to ten percent of the population may require surgical intervention. As a result of these efforts, the medical statistics for the Kursk Oblast have shown a reduction in the number of patients with hernias, ulcers, acute pancreatitis, and gastrointestinal bleeding by 23 to 34%. References 8 (Russian).

UDC 616.12-05.4-085.849.19

Clinical and Experimental Aspects of Novel Approach Involving Laser Therapy for Ischemic Heart Disease

18400289c Moscow SOVETSKAYA MEDITSINA in Russian No 10, Oct 88 (manuscript received 19 Jan 87) pp 81-84

[Article by B. I. Khubutiya, Z. B. Khubutiya, and A. A. Sigayev, Chair of Operative Surgery and Topographic Anatomy, and No 2 Chair of Internal Medicine, Ryazan Medical Institute; Ryazan Oblast Center of Vascular Surgery]

[Abstract] Therapeutic trials were conducted with a helium-neon laser in the management of ischemic heart disease in 37 male and 4 female patients ranging in age from 37 to 60 years. The laser beam from an LG-75 apparatus ($0.63 \mu\text{m}$, 24 mW power output) was directed at the sinocarotid projection with a 2.6 cm diameter coverage. Exposure lasted for 5 min, with the total course consisting of 15 procedures. Subjective and objective improvements were noted within the first few days. On balance, marked clinical effect was noted in 33 (80%) of the patients, consisting of a decrease in the heart rate, blood pressure, and peripheral vascular resistance. Stroke volume generally showed an increase, as did the minute volume. Stress testing showed an increase in stress tolerance, from a pretreatment average threshold of 88.3 plus or minus 6.2 W/min to a post-treatment figure of 128.2 plus or minus 4.7 W/min ($p < 0.001$). The course of treatment did not entail any adverse effects that called for termination of the treatment although an increase in the incidence of angina pectoris was noted in 10 patients after 3-5 procedures and persisted for 1-3 days. A control group of 18 patients with

similar clinical indications were managed by conventional drug therapy. In the latter group, angina pectoris was completely eliminated in 7 patients. In the remaining patients, the incidence of angina pectoris was lowered, while the reduction in peripheral vascular resistance obtained with chemotherapy was less pronounced than with laser therapy. References 16: 13 Russian, 3 Western.

UDC 355.13:65.012.12

Use of Multidimensional Statistical Analysis Methods for Improvement of Occupational Psychological Screening

18400347 Moscow VOYENNO-MEDITSINSKIY ZHURNAL in Russian No 11, Nov 88 pp 18-21

[Article by Col. of Medical Services B. V. Kulagin, candidate of medical sciences; Col. of Medical Services M. M. Reshetnikov, candidate of medical sciences; and Maj. of Medical Services S. T. Sergeyev]

[Abstract] The authors took issue with the "traditional" method of psychological testing used in the selection of individuals for various technical positions. They demonstrated the practical applicability of multidimensional mathematical and statistical analysis in screening driver trainees; the screening criteria were developed with a BMDP program package that factored in considerations of "traditional" psychological testing methods. Cluster analysis was used to place the trainees into one of two proficiency groups. Those in the first group exhibited lower-than-average performance, while those in the second group performed better than average. The results proved gratifying. The principal feature of the method is that it places individuals into psychological groups characterized by specific indices of occupational activity, rather than merely predict performance.

Antigenic Properties of Vaccinia Virus and Recombinant Viral Strains Containing Heterologous Genes

18400350 Bratislava ACTA VIROLOGICA in Russian
Vol 32 No 5, Sep 88 (manuscript received 29 Jun 87)
pp 406-413

[Article by N.V. Chelyapov, T.P. Antonova, N.N. Yanova, and V.I. Chernos, Moscow Scientific Research Institute of Viral Preparations, USSR Ministry of Health, Moscow]

[Abstract] Recent developments, plus the genetic engineering of recombinant viruses, have made it possible to view vaccinia virus (VV) as a vector for new generations of vaccines. Detailed analysis of antigenic and immunogenic properties of individual proteins of this complex virus became possible only with the advent of the immunoblotting method; as yet, the literature contains no data on the spectrum of VV determinants for man. The researchers are studying the engineering of recombinant vaccinia viruses

capable of inducing hepatitis B virus surface antigen (HBsAg) for possible use in preparing a recombinant vaccinia hepatitis vaccine (VHV) for a public health program. They investigate the effect of insertion and expression of heterologous genes (S-gene of hepatitis-B virus and TK gene of herpes simplex virus) on the formation of antibodies to virion proteins of the LIVP strain of vaccinia virus. Experiments were carried out on rabbits showing formation of antibodies to most of the structural proteins of VV, including internal nucleocapside proteins. Insertion of heterologous genes into the VV genome had no effect on the spectrum of antibodies forming towards the virion proteins. Data from studies of human subjects indicated that virus-neutralizing antibodies and antibodies to most VV structural proteins were retained for many years; revaccination with recombinant vaccinia virus stimulated synthesis of antibodies to virion proteins, but did not change the spectrum of antibodies. Humans and rabbits appeared to have identical spectra of antibodies toward VV virion proteins. References 35: 5 Russian, 30 Western.

UDC 613.155.3:615.33/.35.012.6]:614.89

New Pulmonary Respirator

*18400321 Moscow GIGIYENA TRUDA I
PROFESSIONALNYYE ZABOLEVANIYA in Russian
No 1, Nov 88 pp 46-48*

[Article by N. N. Maksimenko, N. P. Rumyantseva, and V. N. Smozhenkov, Biological Instrument-Making Institute, Moscow]

[Text] Filtering respirators are used to protect workers' respiratory organs from harmful aerosols. The analysis conducted and in-house research¹ showed (Table 1) that many of them do not meet the requirements of the working conditions of personnel in the microbiology

industry from the standpoint of certain characteristics such as the penetration coefficient.

At the same time, the ShB-1 Lepestok¹ merits special attention. It offers a high degree of protection against the most penetrating of aerosols, produces negligible restriction of fields of vision, and has a low inhalation/exhalation resistance.

An ER-B (Estonian respirator, biologic) respirator of the Lepestok type has also been developed. The ER-B unit includes an expander, a band, and 10 filtration elements with strangulators. Unlike the prototype, this design of the ER-B respirator enables efficient use of the raw material resources that go into its manufacture, thanks to reusable expanders and straps. In the future, given the proper organization of the assembly of the filtration elements at the sites at which the respirator is used, reusable strangulators will also be possible.

Table 1. Comparative Evaluation of the Operating Properties and Breakthrough Coefficient of Various Respirators

Respirator Name	Filtration Material Used in Respirator	Mass, g	Restriction of Field of Vision, %	Resistance (in Pa) With Air Flow Rate of 30 l/min	Breakthrough Coefficient With Regard to Bacterial Aerosol, %
Lepestok-200	FPP [not further identified]-15—1.5	10	12	29	0.05
Lepestok-40	FPP-70—0.5	10	12	12	0.43
Lepestok-5	FPP-70—0.2	10	12	7	2.45
Snezhok-K	FPP-15—1.5	70	16	3	0.23
Astra-2	FPP-15—1.5	230	23	31	0.36
U-2k	FPP-15—1.5, fine-pore polyurethane foam	50	14	50	1.24

The first stage of the laboratory tests of the new respirator included an evaluation of the protective efficiency of the respirators' filtration elements based on the breakthrough coefficient with sodium chloride and a bacterial aerosol. (This experimental research was conducted under the direction and with the participation of V. V. Buyanov, candidate of medical sciences.)

An aerosol with an average geometric diameter of 0.7 μm was produced from a 0.2 percent aqueous solution of sodium chloride by using a UZUA-1 ultrasound aerosol generation unit.

An aerosol bubble-generator was used to produce a bacterial aerosol. The aerosol generated, which had an average geometric diameter of 2-4, entered a special chamber where a concentration of 10^4 - 10^5 colony-forming units per liter [CFU/l] of air was created. The quantity of bacterial particles was determined by taking air samples at two BP-35/25-4 impactors connected in tandem. The fractional dispersion composition of the bacterial aerosol in the chamber was determined by using an MB-1 impacter.²

The evaluation of the protective properties of the filtration elements of the ER-B and ShB-1 Lepestok respirators confirms (Table 2) that the breakthrough coefficient for the sodium chloride aerosol is less than that for the bacterial aerosol.

Table 2. Results of Laboratory Evaluation of the Protective Properties of the Filtration Elements of a Lepestok-200-type ER-B Respirator

Name of Filtration Element	Filtration Material Used in Respirator	Type of Expander	Breakthrough Coefficient, % Aerosol Type
			Sodium Chloride Bacterial
ER-B	FPP-15—1.5	Fastened	2×10^{-2} 5×10^{-3}

Table 2. Results of Laboratory Evaluation of the Protective Properties of the Filtration Elements of a Lepestok-200-type ER-B Respirator

Name of Filtration Element	Filtration Material Used in Respirator	Type of Expander	Breakthrough Coefficient, % Aerosol Type	Sodium Chloride	Bacterial
ShB-1	FPP-15—1.5	Bonded	4×10^{-2}	6×10^{-3}	
ER-B	FPFS [not further identified]-15—1.5*	Fastened	1×10^{-2}		2×10^{-3}
ShB-1	FPFS-15—1.5	Bonded	1×10^{-2}		2×10^{-3}

*The material sustains repeated sterilization by live steam.

Comparative tests of the ER-B and ShB-1 respirators and cotton gauze were conducted with volunteers during the second stage of the laboratory research.

The results of the comparative tests conducted make it possible to conclude that the ER-B respirator has virtually the same protective properties as the ShB-1 Lepestok respirator, both of which have a considerably higher protective efficiency than does the cotton gauze (Table 3).

Table 3. Results of a Comparative Evaluation of the Protective Properties of ER-B, ShB-1, and Cotton Gauze Respirators

Respirator Name	No. of Tests	At Beginning of Experiment	Breakthrough Coefficient, %	
			After 1 Hr 30 Min	After 5 Hrs
ER-B:				
Lepestok-200	55	0.2/0.11-0.26	0.36/0.18-0.49	0.43/0.26-0.55
Lepestok-40	15	0.63/0.34-1.05	1.1/0.81-1.7	1.3/0.91-1.78
Lepestok-5	15	1.2	2.8	3.5
ShB-1 Lepestok-200	50	0.17/0.11-0.25	0.23/0.19-0.42	0.34/0.26-0.48
Cotton Gauze	10	2.0	24.0	22.3

Note: The test data presented are for a sodium chloride aerosol, with a volunteer working for 5 hours in a respirator with three measurements and one reading. The average value is over the line, and the confidence limits with a 95% probability are below the line.

Production tests of the ER-B respirator were conducted. They yielded positive results.

The design developments conducted make it possible to begin manufacturing Lepestok-type ER-B respirators, with a subsequent increase in production volumes. Thanks to the use of a new technique for the thermal bonding of products, the filtration elements for the Lepestok-type ER-B respirator may be manufactured from gauzeless FP materials combined with nonwoven fiber materials.

Conclusion. A modification of the Lepestok-type respirator, the ER-B (Estonian biologic respirator), which is equipped with reusable components, has been developed.

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UDC 612.76

Similarities in Kinematic Programs for Human and Millipede Gait

18400302a Moscow ZHURNAL OBSHCHEY BIOLOGII in Russian Vol 49 No 6, Nov-Dec 88 (manuscript received 20 Nov 86; in final form 20 Jul 87) pp 741-751

[Article by A. L. Karpovich, Institute of Information Transfer Problems, USSR Academy of Sciences, Moscow]

[Abstract] A comparative mathematical analysis was conducted on the kinematic data obtained for human locomotion and the locomotion of two millipede genera (*Pachyulus flavipes* and *Scolopendra cingulata*) with, respectively, 120 and 20 pairs of legs. After appropriate linear scaling, the gait patterns for human and millipede locomotion were found to coincide. Analysis of the space and time factors also yielded overlapping plots, provided that linear but unequal scaling was employed for the coordinates. Additional confirmatory data was obtained for cockroaches, leading to the conclusion that the central engrams for locomotion are basically similar for phylogenetically distant species. Figures 4; references 18: 10 Russian, 8 Western.

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